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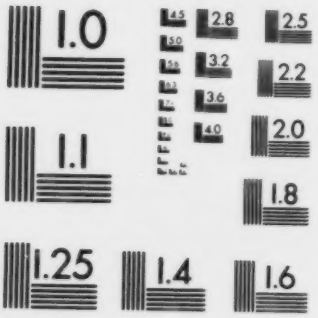

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ELIZABETH METIS SETTLEMENT
LAND USE INVENTORY
– PLANNING FOR THE FUTURE

Alberta Municipal Affairs
Planning Services Division
Planning Branch
Lakeland Unit

February 1985

Alberta
MUNICIPAL AFFAIRS

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CHAPTER I
EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

1.1 PURPOSE OF DOCUMENT

The purpose of this report is to inventory and examine the major physical and human resources of Elizabeth Metis Settlement.
This report is intended to be used as an information base and guide for future planning on the Settlement. It was prepared by the Lakeland Unit, Planning Branch, Alberta Municipal Affairs for the Metis Development Branch, the Federation of Metis Settlements, and Elizabeth Metis Settlement. Others expected to use the report in Settlement-related decisions are government agencies, municipalities, and Settlement residents.

1.2 BACKGROUND INFORMATION

Elizabeth Metis Settlement is located 348 km (218 mi) northeast of Edmonton and 28 km (17 mi) south of Cold Lake Alberta on the Alberta/Saskatchewan border. It covers an area of 25,642 hectares (63,360 ac) and has about 500 members (some 417 living on the Settlement itself). Settlement members are not required to live on the Settlement although most do. Of the 72 dwellings (including mobile homes) only about 30% are located in the hamlet, the rest are in the rural area. The hamlet is the focal point, with a school, church, store, administration and rec-

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reation building and structures. The hamlet is serviced with water but not sewer.

The culture and lifestyle of Settlement residents has been closely linked with the environment. Like Albertans in many parts of the province, Settlement families still obtain an important portion of their food from the land through domestic livestock raising, fishing, hunting, and gardening.

The lack of on-Settlement full-time employment opportunities may mean lower incomes for some residents. However, seasonal employment (logging, heavy equipment operation, fire fighting), when combined with other activities such as farming, trapping and fishing, can mean a good living. Settlers tend to place a stronger emphasis on family unity, education, and daily living than on money and material possessions.

1.3 SUMMARY OF PHYSICAL/CULTURAL RESOURCES AND OBSERVATIONS

The following sections (1.4 through 1.18) highlight the more significant existing physical and human resource elements on Elizabeth Metis Settlement. They are intended as a brief synopsis of the major chapters in the report. More detailed information on any topic area can be obtained from the related section in the body of this report.

1.4 CLIMATE

The Settlement experiences short warm summers and long cold winters. At about 600 m (1969 ft) above sea level it receives a yearly average of 44.8 cm (17.6 in) of rainfall; 283.5 hours of summer sun; 97.5 hours of winter sun; and has about 95-105 frost-free days.

1.4.1 OBSERVATIONS

- In view of the climatological circumstances affecting the Settlement, the growth of 'cold climate' grain and field crops such as Barley, Oats, Polish Canola, and forages could be considered since they mature earlier.

- Since micro-climatic factors (soils, topography, drainage, altitude, etc.) can affect agricultural production, the use of expert advice should be utilized to assist in defining field crop and other products to be raised on the Settlement.

- Areas on the Settlement identified as suitable for the production of quality yields of field crops, because of favourable micro-climatic conditions, should be retained for such production.

- The preparation and implementation of a short and long term agricultural strategy should be undertaken by knowledgeable persons from both on and off the Settlement to maximize the unique micro-climatic circumstances existing on the Settlement.

1.5 SURFICIAL AND BEDROCK GEOLOGY

The Settlement has been extensively glaciated resulting in layered depositions of sand and gravel extending from 46-122 m (150-400 ft) to bedrock. Its surface is known as a hummocky morainal plain with numerous "knobs and kettles" resulting in many isolated depressions containing wet organic materials and ponds. Overall relief (ie. average distance between a high spot and an adjacent low spot) is not greater than 30 m (98 ft).

1.6 DRAINAGE

Drainage patterns are not well defined, resulting in extensive areas of bog and wetland. The Settlement and surrounding region is an important part of the re-charge/discharge source for the Beaver River - Churchill River systems. Bates lake, covering about 259 ha (640 ac) is the major lake on the Settlement, with Soars, Chandler, and Thompson Lakes other drainage features there.

1.6.1 OBSERVATIONS

- When development is proposed on the Settlement, the importance of maintaining the surface water drainage system in a natural state should be recognized, so that contamination, erosion and siltation does not occur.

- When lands are proposed for clearing to increase grazing acreages or other purposes, the overall affect on the natural drainage system should be considered so that erosion of sloped areas and siltation of watercourses and water bodies is avoided.

- In utilizing the landscape for farming, residential, or other purposes, the importance of maintaining the natural drainage system as free of contaminants as is possible, should be recognized.

- The importance of the Settlement land base as a headwaters resource area for the Beaver River - Churchill River systems should be considered.

1.7 OIL AND GAS

Heavy oil development in the Cold Lake area has generated interest in the potential of the Settlement as a small part of the larger heavy

oil sphere. At the end of 1983 there were about 25 wells drilled on the Settlement, although no intensive exploration was underway.

1.8 SAND AND GRAVEL

At least four potential sources of gravel have been identified on the Settlement, all north of the hamlet. Given the glacial history of the area, there would seem to be potential for additional recoverable reserves. Most of the gravel currently used in road construction comes from off-Settlement sources.

1.8.1 OBSERVATIONS

- The assistance of geologists may be helpful in the search for adequate and reliable sources of gravel.

- Any sand and gravel deposits which might be located could be maximized using the advice of geologists.

- Prior to the development and exploitation of gravel and sand resources, the longer term reclamation potential for the lands should be carefully considered.

- In utilizing any gravel resource, the longer term affects on the groundwater table(s) and water supply should be determined and evaluated, particularly where such resources are located in groundwater recharge/discharge areas.

1.9 PEAT MOSS

Peat moss is a non-renewable mineral included under surface rights, but performs important drainage and groundwater re-charge/discharge functions which can affect short and long term land use, especially wildlife habitat.

There is no commercial production of peat on the Settlement, although some deposits having such potential have been identified. Further study into the economic feasibility of the material is essential prior to any investment in the industry.

1.9.1 OBSERVATIONS

- Should it be decided to pursue a peat industry on the Settlement the preparation of an economic feasibility study by qualified consultants should be undertaken.

- The potential for land use conflicts (eg. grazing and wildlife habitat versus peat production) should be determined and addressed when considering whether and where the commercial production of peat should occur.

- Important components in any feasibility study regarding commercial peat production should be the longer term affects of peat removal on water regimens on the Settlement from a groundwater and surface water perspective.

1.10 DOMESTIC WATER RESOURCES AND SUPPLY

The hamlet area of the Settlement has a 73,477 litre (16,163 imperial gallon) water storage, treatment, and distribution system installed in 1983. Elsewhere, the rural areas rely on drilled wells which extend between 18-61 metres (60-200 ft) into a highly productive series of sand and gravel aquifers underlying most of the Settlement. Rates of water production from these wells are generally excellent (23-455 litres per minute, or 5-100 igpm) although the water is very high in dissolved solids, particularly iron which causes an undesirable taste and has certain staining qualities.

Successive well drilling programs have resulted in about 100 wells on the Settlement, mostly in the rural areas. However a lack of mechanical delivery systems from the well to the house means some dwellings do

not have indoor running water. Hamlet residences however, are encouraged to hook up to the central water distribution system, but there is no centralized sewage system for the hamlet. A septic tank program is proposed for the rural areas of the Settlement in 1985-86 to better accommodate waste water disposal.

1.10.1 OBSERVATIONS

- In order to maximize the efficiency of the recently installed hamlet water system new residential development on the Settlement should be encouraged to locate in the hamlet area in accordance with an adopted hamlet plan.

- Prior to allocating lands for residential and/or farming purposes outside the hamlet areas, the potential availability of groundwater should be determined.

- A regular program of water well maintenance could be established to ensure a reliable domestic water supply free of harmful contaminants.

- Mechanical water delivery into Settlement residences from each dwelling's outdoor well, or from the communal distribution system, could be considered.

- 'Conditioning' of domestic water supplies to reduce iron and hardness could improve its taste, and should be considered on the Settlement.

- Should a sewage lagoon system be contemplated for the Settlement, all existing and any new buildings and structures erected in the hamlet should be connected to it.

1.11 AGRICULTURAL DEVELOPMENT

Agriculture on Elizabeth Settlement is characterized by small mixed farms. About 12 families are involved in farming, mostly part-time. Approximately one-fifth of the land base appears suitable for conventional agricultural production, although according to the Canada Land Inventory - Soil Capability for Agriculture maps, the predominant soils Class is 5. Soils rated 5-7 or Organic are considered to be "poorer" agricultural lands. The remainder of the lands are wet or hilly and unsuitable for cropping.

Agriculture is generally hampered by a short growing season of 90-120 days, but there is potential for "cold climate" varieties of canola, barley and oats. Nearly all land with road access (about one-third of the total land base) has been allocated to settlers, but much land is under-developed or underutilized. Fields (about 70) are small (.20-57 ha) (1/2-140 ac.) and fragmented, due in part to topographic constraints, resulting in smaller farms.

There are about 1000 cattle (kept by about 1/3 of residents) and 50-60 horses on the Settlement. Both animals are important to the Metis culture. Many of the cattle stocks were developed from a government herd formerly kept on the Settlement. The Soars Lake Cattlemen's Association (an Association of Settlement residents) leases about 48 sections of land in the south half of the land base for grazing another 1500 cattle.

Clearing of land occurs at a regular rate (approximately 81 ha - 200 ac per year) according to budget and need. However, high capital costs, high technology needs, high management requirements of today's agriculture are major limiting socio-economic factors. Other factors are small parcel size, opportunity for off-farm employment, and credit limitations. A variety of government and private programs are available to the settlers to assist them.

1.11.1 OBSERVATIONS

- When allocating lands to residents, with either farming or non-farming experience, the agricultural capability of the lands should be considered.

- When developing land for non-agricultural purposes, those lands with the better agricultural ratings should be avoided wherever possible.

- When clearing of the land is considered in order to expand the agricultural land base on the Settlement, only those lands with the better soils ratings and favourable topographic relief should be considered.

- Prior to opening new land for farming, the soils should be sampled and tested to determine their suitability for agricultural purposes, and expert advice should be sought to supplement current local knowledge regarding cropping choices and methods.

- Given the limited amount of better agricultural lands on the Settlement, the lands should, whenever possible, remain in larger parcels in order to maximize the agricultural potential.

- When allocating land to settlers, those with an aptitude for and an interest in a farming career could be directed to the better farmland areas where larger parcels of land may be available for agricultural success.

- The advice of professionals working with knowledgeable residents may be of assistance in determining and implementing an agricultural development program for the Settlement.

- In order to reduce the costs of agricultural production, the co-operative purchase, sharing and/or leasing of new or used equipment may be helpful.

- The establishment and maintenance of grazing areas on the Settlement should not interfere with prime wildlife areas so that two strongly desired land uses do not conflict.

- Those settlers with an interest in agriculture should be encouraged to pursue formal training to supplement an extensive practical knowledge, so that the opportunity for farming success is increased.

- Membership in local agricultural Service Boards could be pursued in order to benefit from the sharing of knowledge and ideas relative to farming.

1.12 FORESTRY

Elizabeth Metis Settlement is within the boreal mixed forest region of Canada. Major tree species on the Settlement include trembling aspen, paper birch, white spruce and balsam poplar, as well as willow, black spruce and jack pine. About 80% of the Settlement rates only Class 4 (Canada Land Inventory) in terms of potential for merchantable timber due to climate, drainage, and topographical problems. Limited harvesting of wood products (fenceposts, firewood, rough lumber) occurs occasionally, but a forest management program is required to establish commercial stands of timber over the longer term.

1.12.1 OBSERVATIONS

- Where desired, trained personnel working with knowledgeable residents, could be encouraged to determine whether and where on the Settlement a long term commercial afforestation project could be established.

- Trained foresters could be requested to assess if and where on the Settlement lumber for local consumption could be successfully produced over the longer term.

- The preparation of a forest management and utilization plan for the Settlement could be prepared using the advice of trained persons.

- Any forest management and/or utilization plans should not conflict with the long-term agricultural goals of the Settlement.

- Rough lumber for local consumption might be obtained at reasonable cost by renting a portable sawmill and related equipment, as required.

1.13 WILDLIFE

Moose and deer are common to most of the Settlement which has excellent habitat and higher than average animal concentrations. The Canada Land Inventory rates the Settlement predominantly as a very favourable Class 2 (see Appendix 3). Settlement Council has imposed moose harvesting quotas and are proposing a sanctuary to maintain animal populations at desirable levels. Elk are either rare or non-existent on the Settlement.

About 10 trappers are active, occasionally taking beaver, muskrat, coyote, wolf, mink, and other animals on a seasonal basis. While no commercial fishing occurs, pike and perch are recreational species taken. Many varieties of ducks and geese are also harvested for food and sporting purposes.

1.13.1 OBSERVATIONS

- The establishment of wildlife management programs on the Settlement could ensure that long-term wildlife populations are maintained at appropriate and desirable levels.

- The assistance of trained wildlife personnel could be beneficial in the identification and management of wildlife resources.

- Wherever possible, domestic livestock pursuits should not conflict with prime wildlife habitat which may be identified on the Settlement.

- As on certain other Metis Settlements in Alberta, the possibility of utilizing appropriate areas for "game ranching" could be examined.

1.14 OUTDOOR RECREATION

The variety of terrain, forest cover, wetlands areas, and water bodies affords an excellent opportunity for recreational activities whether on foot, motorized vehicle, or horseback. Several of the Settlement lakes have excellent shorelands for beach and other water-oriented activities. Council is considering the possibility of permitting cottage development on Soars, and other suitable lakes.

1.14.1 OBSERVATIONS

- In any development of the land base for outdoor recreation purposes, access to the desired areas by all members of the Settlement should be assured.

- When developing outdoor recreation areas for intensive and active use, the carrying capacity of the landscape including lakes should

be carefully determined so that the natural attributes are not diminished.

- In development of shoreland for recreation purposes, general identification of potential sites using the Canada Land Inventory system could be utilized, followed by specific on-site determinations of desirable locations.

- Prior to the selection and development of sites for outdoor recreation use, the services of trained personnel could be utilized to assist knowledgeable settlers in site selection and planning.

1.15 POPULATION

The 1983 Census by the Metis Development Branch, Alberta Municipal Affairs, indicates 417 persons living on-Settlement. Another 87 members live off-Settlement. Since 1940 the population has steadily increased until rising sharply after 1979. The population structure is moving towards a more youthful base with 52% of total population under 19 years in 1983, up from 44% in 1972. The male-female ratio is almost evenly split. Most (86%) of the approximately 60 households in 1979 were headed by males averaging 46 years of age.

1.15.1 OBSERVATION

- The need for social programs and community facility development

could be affected by the changing nature of the population structure on Settlement.

1.16 HOUSING

Several housing programs have been implemented in recent years resulting in a total of 72 units being constructed on the Settlement (1984). These include; Metis Development Branch Housing; Metis Settlement Housing Program; Emergency Repair Program; Rural Mobile Home Program; Residential Rehabilitation Assistance Program; and Seniors Programs. About 60% of the units have been erected since 1971 with about 70% of all dwellings in rural areas. In August 1984 there were 17 mobile units on Elizabeth Settlement.

The Waskayigun Association determines housing need and family placement, and as a non-profit group, acts to secure housing grants and assistance for the Settlement. Homes are heated with propane, wood, and oil, with telephone and power available to many.

1.17 INFRASTRUCTURE AND SERVICES

A Council of 5 locally-elected residents provide local administrative services, and make recommendations to the Metis Development Branch for expenditures and Settlement membership. Government departments are responsible for roads, power, telephone, and schools. Funding for various Settlement programs and its local administration comes from the province and the Metis Population Betterment Trust Fund.

Settlement Administration is carried out from an Alberta Government office building in the hamlet. There are no rail facilities nor an airport on the Settlement.

The Settlement receives visiting health and dental care; elementary, secondary, and post-secondary education services; R.C.M.P. protection; and appropriate new road construction and maintenance as required.

Recreation includes baseball, rodeos, hockey, Cree cultural groups and dancing, senior citizens and youth clubs.

Although the local elementary Elizabeth School has a septic tank and lagoon system, it is not available to the hamlet generally. A communal sewage system for the hamlet is being considered.

1.18 PLANNING FRAMEWORK - GUIDELINES FOR THE FUTURE

Elizabeth Settlement has an abundance of resource development options available to it, but they must be placed carefully in priority and planned so that land use and desired options do not conflict. With the assistance of planning personnel (if desired) the Settlement could consider preparation of a detailed land-use plan to place in priority, its options.

The Settlement and its Council are astute and well informed, and in a position to categorize issues and opportunities affecting the immediate and longer term future of the land base. A desirable process would be to establish the relevant issues and opportunities on the Settlement and then formulate long term goals, objectives, and policies (to reach the goals) for both the urban and rural components of the community. Matters such as maximizing the use of new hamlet water distribution facilities; separating cattle, farming, woodlot, and wildlife habitat uses; and establishing an administrative, economic, and/or cultural focus for the Settlement may need to be addressed in this manner.

As there are a number of land use priorities to be established, and significant issues and opportunities to be addressed on the Settlement, it is important therefore that these matters be addressed in a comprehensive and considered manner. A detailed planning program involving Council and Settlement residents (as citizen advisors, and/or in public meetings) would achieve this task. This document outlines in detail, one approach to developing such a program.

CHAPTER II
INTRODUCTION

2.0 INTRODUCTION

2.1 PURPOSE OF THIS REPORT

This report has been prepared as an inventory and analysis of the major physical and cultural resources of Elizabeth Metis Settlement. In addition this report represents a unique and pioneering step in planning for Metis Settlements in Alberta since it seeks to develop broader planning guidelines for use by the Settlement and its Council in planning for the future development of the community and land base.

This report is intended to be used as an information base and guide for future land use planning. It was prepared by the Lakeland Unit, Planning Branch, Alberta Municipal Affairs for the Metis Development Branch (A.M.A.), the Federation of Metis Settlements, and Elizabeth Metis Settlement. The report represents an initial phase in a potentially ongoing planning process and provides a departure point for future land use decision-making and development planning. It is expected that this document will be utilized by Settlement residents, government agencies, adjacent municipalities, and the private sector in making decisions related to the Settlement.

This report does not contain Recommendations. Observations noted as a result of data collected regarding the Settlement, have been made

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periodically through this report. They should not be construed as identifying or suggesting areas of deficiency, lack of on-Settlement expertise, or inaction. Elizabeth Settlement and Council are very progressive, well informed, and possess considerable expertise in many pursuits, and are continually acting to resolve problems and seize opportunities that benefit their community.

This report was prepared as a companion document to several large-scale, wall-sized, coloured, display maps and overlays which were delivered to the Settlement, the Metis Development Branch, and the Federation of Metis Settlements offices in mid 1984. The maps which form an important part of this report are essentially miniaturized versions of the larger display maps with relevant components highlighted for clarification and ease of reference in the text.

2.2 MANDATE

The priorities of this research project which were established in consultation with the Metis Development Branch, the Federation of Metis Settlements, and Elizabeth Metis Settlement, include the following:

1) Preparation of a land use inventory which is acceptable to the Metis Development Branch and which is useful and of assistance to the Elizabeth Settlement Council and its administrative personnel

2) Preparation of a series of wall-sized, large-scale display maps and overlays which effectively illustrate land-use information to assist the Settlement Council, its administrative staff, and others in decision-making

3) Collection and analysis of baseline data on physical and human resources and preparation of appropriate planning guidelines using such data, to assist Settlement Council and others in determining longer term development parameters for the community

4) Focus on the development potential and highlight positive changes which have occurred, or could occur, on the Settlement

2.3 REPORT ORGANIZATION

This report is organized as follows:

Chapter One — provides an Executive Summary

Chapter Two — outlines the purpose of this project, its intended use, organization, methodology, and limitations

Chapter Three — examines the Settlement in its regional context

Chapter Four — examines the physical resources on the Settlement, focussing on climate, topography, geology, water supply, soils, agriculture, forestry, wildlife, and outdoor recreation

Chapter Five — provides an insight into the human resources of the Settlement, examining its administration, population, housing, infrastructure, and hamlet characteristics

Chapter Six — synthesizes many of the observations and data in the report in a set of planning guidelines for use in the longer term development of the Settlement

2.4 METHODOLOGY

The methodology used in the preparation of this report involved the collection and analysis of maps, aerial photographs, numerical data, and other oral and written information. Materials in the form of maps, books, and documents were obtained from libraries or from original sources (government departments) while other raw data was also gathered from the Metis Development Branch (and others) and compiled, analyzed and interpreted.

Interviews and meetings with the Settlement Council, its staff, Metis Development Branch, Federation of Metis Settlements, other

government departments and their staff, and private consultants provided valuable information and insight. Raw data was interpreted and compiled in graphic form by technical personnel from the Lakeland Unit, Planning Branch, and presented in final form by Support Services Branch, Alberta Municipal Affairs.

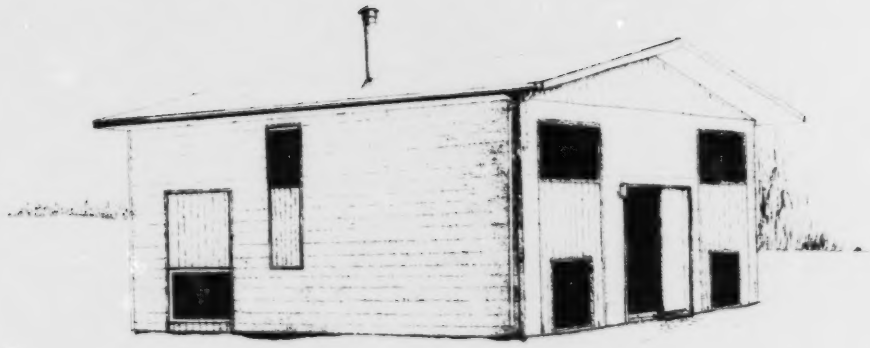
Draft reports were reviewed by data contributors including government departments and the Settlement Council. For each resource sector the existing situation is documented and analyzed with prospects for development discussed and observations catalogued. Mapping has been prepared at a scale, format, and colour combination which utilizes the latest cartographic techniques, to provide for clarity, and ease of interpretation.

2.5 LIMITATIONS

This report is not without limitations. Since it represents a first effort to document and map all the major physical and cultural resources of Elizabeth Metis Settlement, it is anticipated that there may be minor errors and/or omissions. The level of detail was frequently hampered by inadequate, outdated, and even conflicting data. For example, legal surveys of hamlet lots were unavailable or non-existent and had to be interpreted and expanded by extrapolation from plans prepared for installing the central water distribution system.

Information regarding annual grain, forage, and livestock production varied in accuracy and availability. Detailed agricultural and mineral

(gravel, peat) inventories were not available, nor were certain socio-economic components. Despite the limitations, this inventory and preliminary planning framework document provides an initial information base which can be updated periodically as new data is compiled and/or land uses change.



Settlement Office

CHAPTER III
REGIONAL CONTEXT

3.0 REGIONAL CONTEXT

Elizabeth Metis Settlement is located approximately 348 km (218 mi) northeast of Edmonton on the Alberta/Saskatchewan provincial border. It is approximately 28 km (17.3 mi) south of the Town of Cold Lake Alberta and is readily accessible via provincial highway 28 which links the two centres (Figure 1).

Elizabeth is bounded on the south by Fishing Lake Metis Settlement while Kikino and Caslan Metis Settlements are approximately 130 km (80 mi) to the northwest. Elizabeth Settlement was named after the wife of Joseph Dion. He was a disenfranchised Native Indian and school teacher who worked closely with Metis leaders to secure a land base for the exclusive use of Metis people.

The Settlement encompasses all of Townships 59 and 60 Range 1; and three-quarters of Township 59 Range 2, West of the 4th Meridian. The land base consists of approximately 25,642 hectares (63,360 acres) with a total 1983 year end population of about 500 persons.

Elizabeth Settlement is situated in the Beaver River/Churchill River drainage system as an important part of the headwaters discharge area. Waters from the Settlement find their way through this system to eventually empty into Hudson Bay.

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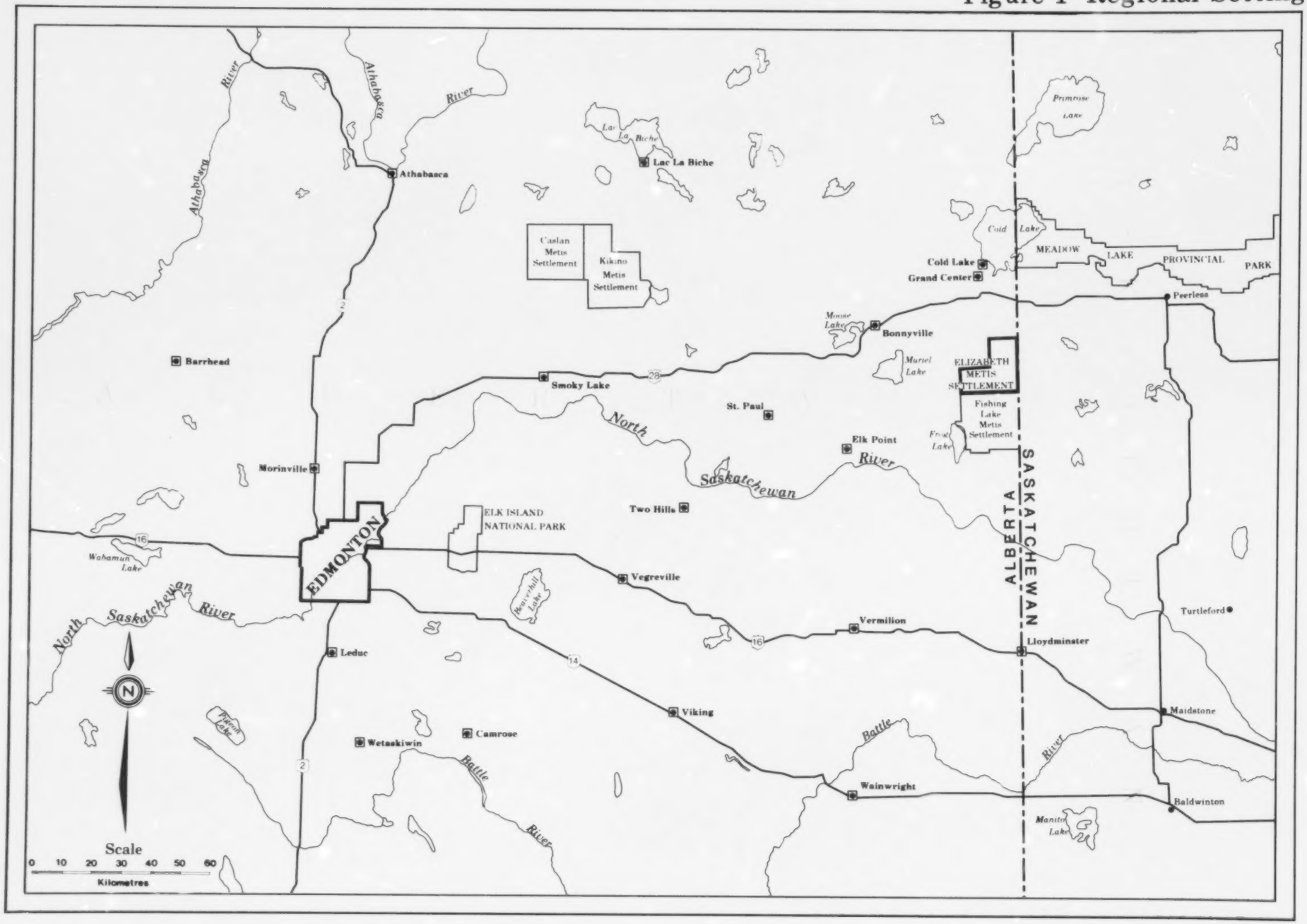
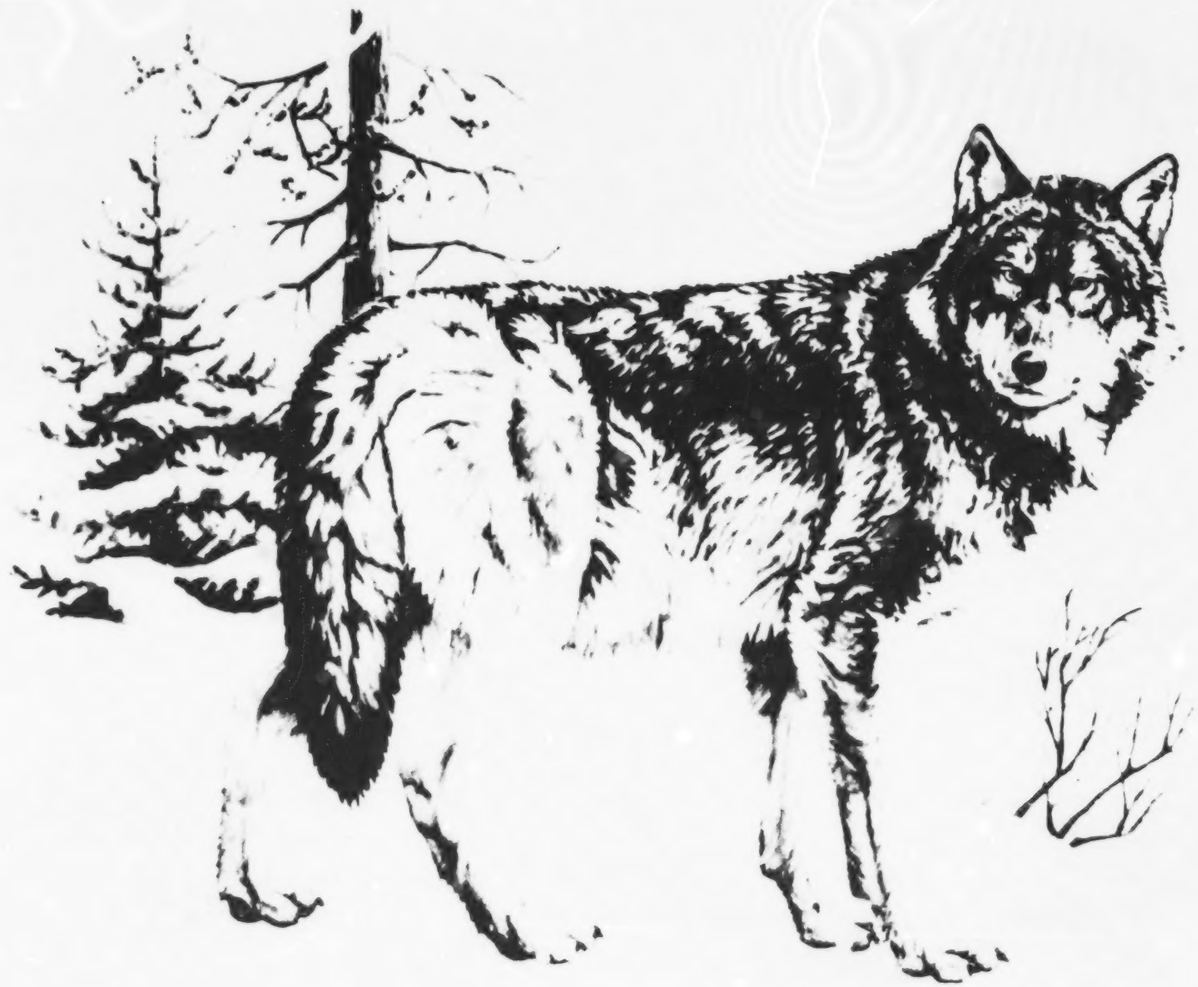
Figure 1 illustrates the location of Elizabeth Metis Settlement in its broader regional context.

Settlement School

Figure 1 Regional Setting





CHAPTER IV
PHYSICAL RESOURCES

4.0 PHYSICAL RESOURCES

4.1 CLIMATE

Since there is no climatological data for Elizabeth Settlement, Environment Canada weather records for Cold Lake, Elk Point, and Tulliby Lake have been generalized by averaging, and are taken as being representative of conditions on the Settlement.

Elizabeth Settlement is located at approximately 579-610 m (1900-2000 ft) above mean sea level (amsl). Cold Lake is 541 m (1775 ft) amsl and 28 km (17.3 mi) north of the Settlement. Elk Point is 604 m (1981 ft) amsl and is located 63 km (39.1 mi) south-west of Elizabeth Settlement. Tulliby Lake is at 579 m (1900 ft) amsl and is 55 km (34.2 mi) due south of the Settlement.

The climate of Elizabeth Metis Settlement is characterized by long cold winters and short warm summers. January is the coldest month with a mean daily temperature of -14.2°C (6.4°F). July is the warmest, having a mean daily temperature of 23.3°C (73.9°F). Mean total precipitation is relatively low, with 44.8 cm (17.6 in) being the average annual rate.

R FOUR

Figure 2 illustrates the average mean monthly maximum temperature in degrees celsius, and Figure 3 illustrates the average mean monthly total precipitation (snowfall-rainfall) in millimetres for the Settlement using this data.

The number of frost free days during the growing season is an important factor in the region's ability to produce crops. It is generally accepted that periods exceeding 90 days of temperatures higher than 0°C (32°F) present little frost hazard to cool season crops. The growing season consists of the frost-free period, plus a small number of days (perhaps 9-10 in total) at the beginning and end of the period.

In the case of Elizabeth Settlement the frost-free period is 95-105 days (approximately) and the growing season is 100-120 days (approximately). The last 'Spring' frost generally occurs in the final week of May, while the first 'Fall' frost generally occurs in the initial week of September.

Local or site-specific factors such as topographic variations, vegetative cover, proximity to water bodies, altitude, and density of human habitation can also cause micro-climatic variations. For example, both the communities of Cold Lake and Tulliby Lake are influenced by water bodies and have recorded frost-free days on the average of 105 and 109 days respectively annually. However Elk Point which is not so affected, has an average of only 88 frost free days.

The availability of adequate rainfall is also an important factor in crop production. Almost 90 per cent of the total rainfall in the area occurs during the growing period from May to September (Figure 4). The wettest month is July when an average of 81.7 mm (3.22 in) of rain falls. May receives 39 mm (1.5 in) while September gets 45.4 mm (1.79 in) of rain.

The timing of rainfall during the growing season is also an important factor in crop production. A spring drought could hinder crop growth while excessive rainfall during late summer and early fall could disrupt the harvest. Figure 4 indicates that in the past, rainfall has been conveniently spaced and reasonably adequate during the growing season.

In terms of available bright sunshine, the Settlement has experienced a thirty year average of approximately 186.6 hours per month. The June, July, August average is 283.5 hours per month, while the December, January, February average is 97.5 hours per month. The availability of bright sunshine has an affect on the ability of crops to grow and mature, as well as the ability to 'dry out' prior to harvesting.

4.1.1 OBSERVATIONS

- In view of the climatological circumstances affecting the Settlement, the growth of 'cold climate' grain and field crops such as Barley, Oats, Polish Canola, and forages could be considered since they mature earlier.

- Since micro-climatic factors (soils, topography, drainage, altitude, etc.) can affect agricultural production, the use of expert advice should be utilized to assist in defining field crop and other products to be raised on the Settlement.

- Areas on the Settlement identified as suitable for the production of quality yields of field crops, because of favourable micro-climatic conditions, should be retained for such production.

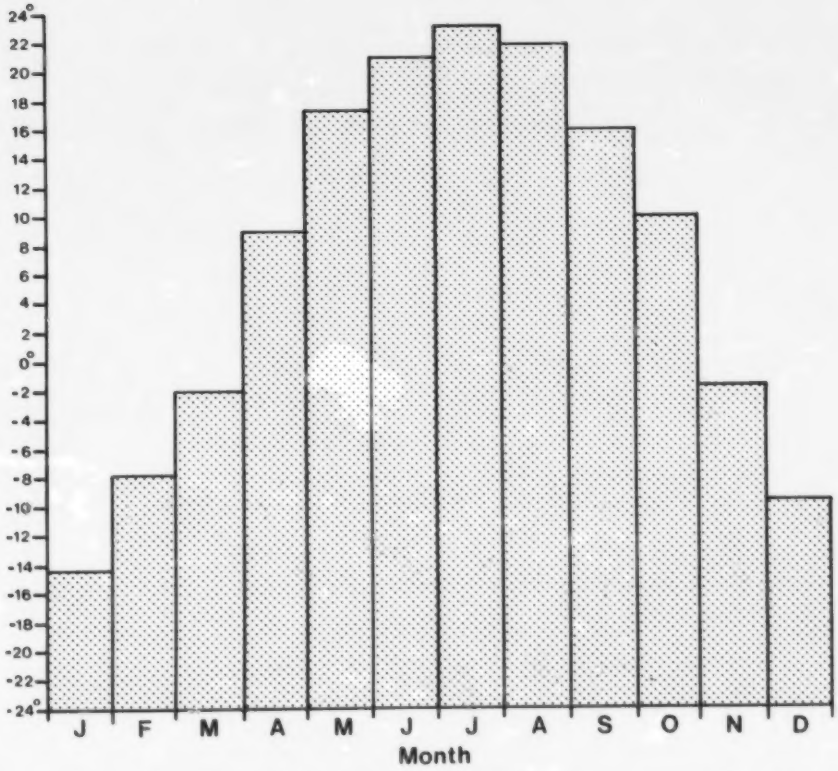
- The preparation and implementation of a short and long term agricultural strategy should be undertaken by qualified persons from both on and off the Settlement to maximize the unique micro-climatic circumstances existing on the Settlement.

4.2 SURFICIAL AND BEDROCK GEOLOGY

The terrain of Elizabeth Metis Settlement consists primarily of hummocky ice disintegration moraine (some sorted, some unsorted rock, sand, gravel) which was deposited by a retreating and stagnating Laurentide (continental) ice sheet tens of thousands of years ago. The deposited materials overlie the Lea Park bedrock formation composed largely of marine shales and siltstones which have been deeply eroded. This has resulted in lower elevations and lower relief over much of Elizabeth, relative to areas outside of the Settlement.

Figure 2

Average Mean Monthly Maximum Temperatures in Degrees Celsius
Elizabeth Settlement Region 1951–1980

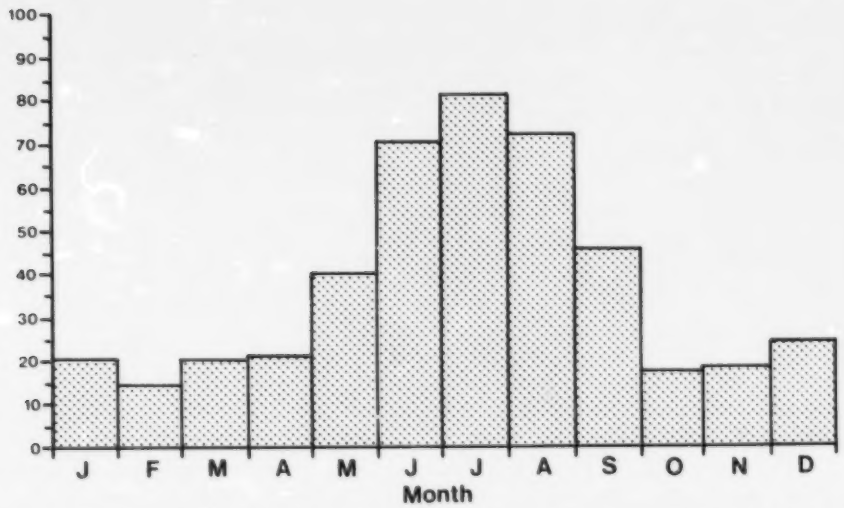


Interpreted from Canadian Normals Vol. 4 Degree Days 1951–1980 Environment Canada using Elk Point / Cold Lake / Tulliby Lake Data.

Figure 3

Average Mean Monthly Total Precipitation (Snowfall & Rainfall) in Millimetres

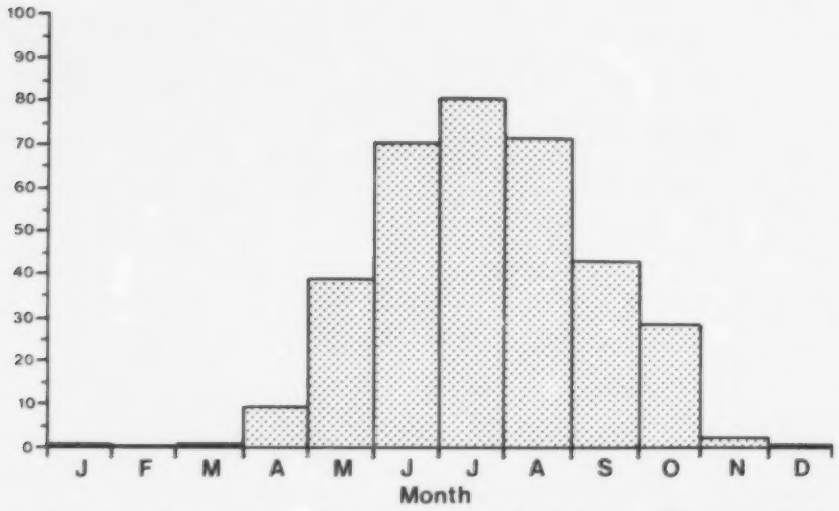
Elizabeth Settlement Region 1951–1980



Interpreted from Canadian Normals Vol. 3 Precipitation 1951–1980 Environment Canada using Elk Point / Cold Lake / Tulliby Lake Data.

Figure 4

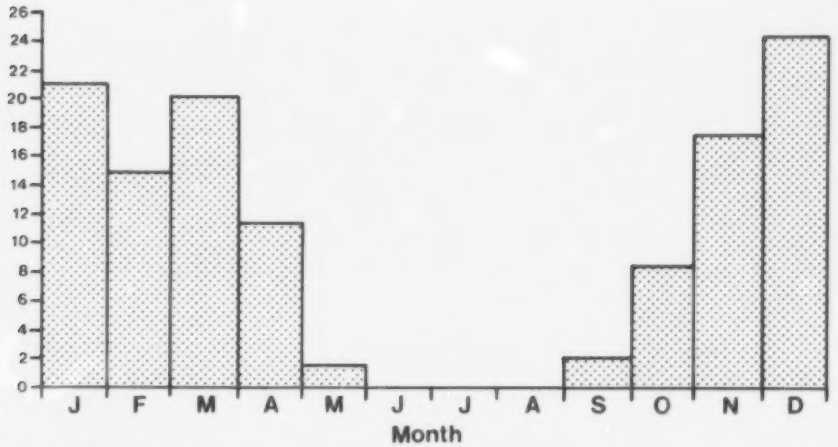
Average Mean Monthly Maximum Rainfall in Millimetres
Elizabeth Settlement Region 1951–1980



Interpreted from Canadian Normals Vol. 3 Precipitation 1951–1980 Environment Canada using Elk Point / Cold Lake /Tulliby Lake Data.

Figure 5

Average Mean Monthly Maximum Snowfall in Centimetres.
Elizabeth Settlement Region 1951–1980



Interpreted from Canadian Normals Vol. 3 Precipitation 1951–1980 Environment Canada using Elk Point / Cold Lake / Tulliby Lake Data

Overall relief in the area (ie. average distance between a high spot and an adjacent low spot on the Settlement) is generally not greater than 30 metres (98 ft), although there is a 228 m (750 ft) difference between the highest and lowest spots on the Settlement. (Figure 7)

Underground (surficial) glacial deposits in the area have been laid down in a series of glacial advance and retreat movements resulting in a sequence of till and intertill sand and gravel deposits ranging in thickness from 46 to 122 metres (150 to 400 ft) from the surface to bedrock. Nearer the surface, deposits consist of an almost equal distribution of undulating to rolling ground moraine interspersed with ridged to hummocky ablation moraine. (Figure 6)

Ground moraine is composed of low relief glacial sediment (mainly till) which was deposited by an active glacier. The till is generally medium textured with some stones and boulders. These boulders have a negative impact for agricultural land use.

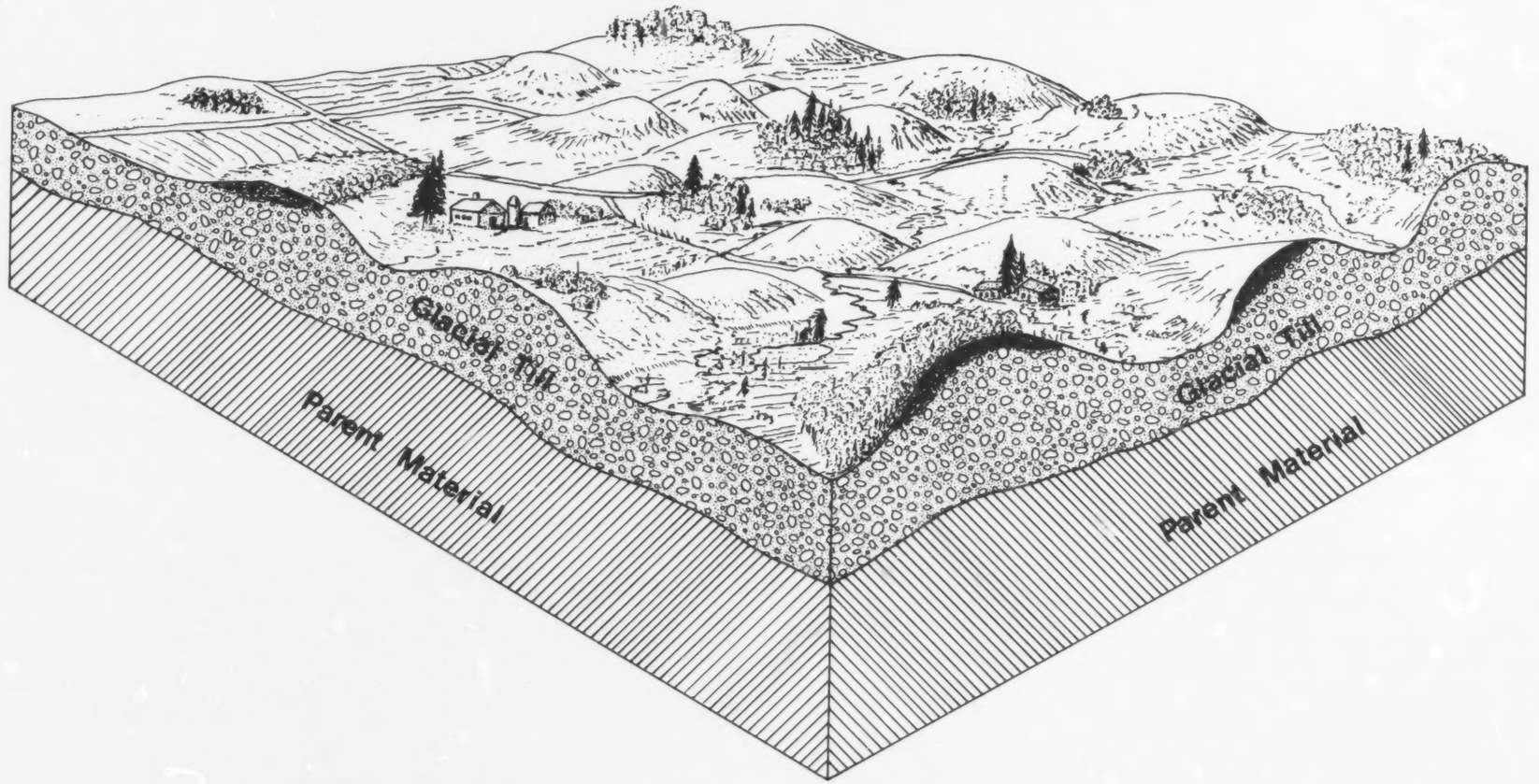
Ablation moraine on the other hand was deposited by a disintegrating, stagnant glacier which produced a hummocky, ridged and pitted topography characteristically called a "knob and kettle" topography. The composition of ablation moraine is varied (as roadcuts may indicate): one hummock could be composed entirely of medium textured "till" while its neighbour could consist of fine sand and gravel. Throughout the Metis Settlement and surrounding vicinity, ablation and ground moraine are interspersed with one another.

The Settlement is also marked by evidence of post-glacial surficial deposits. Interspersed throughout areas of ground moraine are broad lowlands, likely shallow lakes that were formed after de-glaciation, and which have been infilled with organic deposits. Numerous isolated depressions containing poorly drained organic deposits and ponds, are common in the ablation moraine.

There is also evidence of a narrow post-glacial channel running south-west to north-east through the Settlement. This channel was eroded by flowing glacial meltwaters which later impounded within the channel forming a shallow, linear lake. The lake was eventually infilled with organic deposits which are evident today.

In the northeast part of the Settlement, glacial meltwaters deposited a thin layer (less than one metre thick) of sandy glaciofluvial (sediment sorted and washed by glacier meltwater) material over moraine. This undulating to gently undulating glaciofluvial terrain lies adjacent to the narrow meltwater channel.

Figure 6



Block Diagram Illustrating Typical Hummocky Morainal Plain Landscape

4.3 SURFACE WATER BODIES - DRAINAGE

As a result of the extensive glacial history of the Settlement, overall drainage patterns are not well defined. Extensive areas of poorly drained wetland and bog covers about one-half of Township 59 Range 1 and two-thirds of Township 60 Range 1.

A multitude of small and large lakes, creeks, bogs, and sloughs dot the landscape serving two important functions. One major function is that of recharging the local groundwater supply system which underlies the Settlement. The second is related to surface discharge flowing into the Redspring Creek - Beaver River - Churchill River drainage systems extending through Alberta, Saskatchewan and Manitoba to Hudson Bay. The Settlement land base is a part of the overall headwaters resource area for this system.

Redspring Creek is the major surface drainage feature on the Settlement. Its source is a small lake in Section 31 Township 58 Range 1 West of the Fourth Meridian, just inside the northerly limits of Fishing Lake Metis Settlement to the south. The Creek flows northerly to Redspring Lake, to Day Lake, then westerly across Chandler Lake Road and northerly to cross Settlement Road and Main Drive before leaving the Settlement at 35-60-1-4 for the Beaver River.

Bates Lake is also a major drainage feature on the Settlement. It covers approximately an entire Section in water surface area (259 ha - 640 ac). The lake is primarily fed from a large bog covering some seven to

eight sections of land immediately to its south and west. While this extensive wetlands area is unsuitable for agricultural purposes, its forest cover and related plant life afford it a positive rating as a wildlife habitat (Canada Land Inventory - Class 4 - Moose, Elk, Deer) (See Section 4.11.1; Figure 14). Bates Lake drains northwesterly, emptying into Redspring Creek at 27-60-1-4 just south of Sandy Drive.

Soars, Chandler, and Thompson Lakes are the other major surface drainage features on the Settlement.

The extensive areas of hummocky morainal terrain, wetlands bog areas, lakes and creeks, and attendant youthful mixed forest cover (the area has a history of forest fire activity) provide a varied and interesting landscape for the enjoyment of all Elizabeth Settlement residents.

4.3.1 OBSERVATIONS

- When development is proposed on the Settlement, the importance of maintaining the surface water drainage system in a natural state should be recognized, so that contamination,erosion, and siltation does not occur

- When lands are proposed for clearing to increase grazing acreages or other purposes, the overall affect on the natural drainage system should be considered so that erosion of sloped areas and siltation of watercourses and water bodies is avoided

- In utilizing the landscape for farming, residential, or other purposes, the importance of maintaining the natural drainage system as free of contaminants as is possible, should be recognized

- The importance of the Settlement land base as a headwaters resource area for the Beaver River - Churchill River systems should be considered.

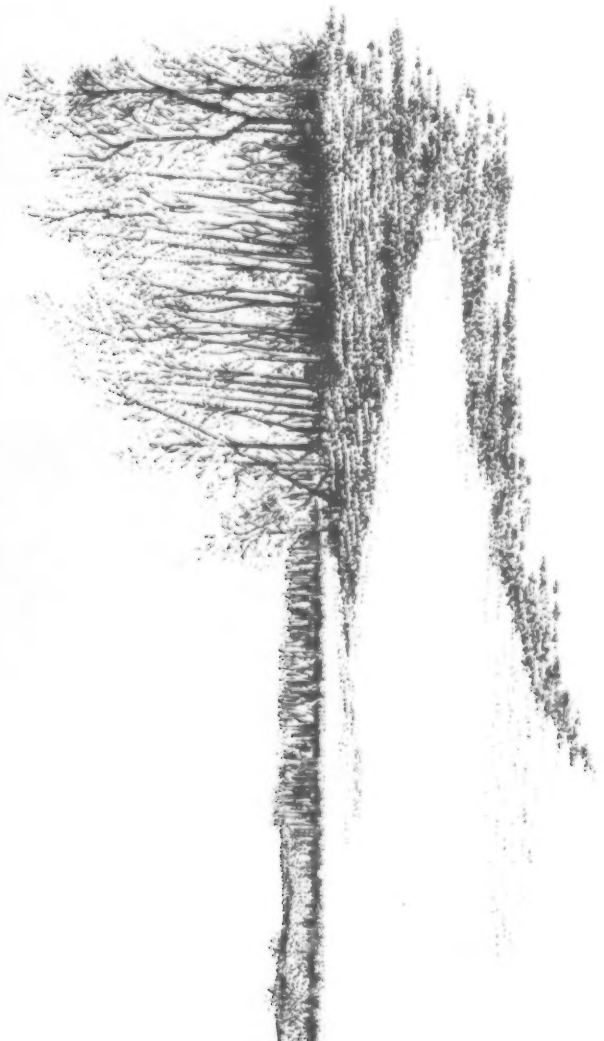


Figure 7

TOPOGRAPHY

4.4 OIL AND GAS

Elizabeth Settlement has been the focus of much interest by gas and oil exploration and development firms over the past 10 to 15 years. Large deposits of heavy oil previously located and now undergoing development in the Cold Lake area have spurred the search for additional recoverable and marketable reserves.

A potentially large reserve of unproven quality or quantity called the Soars Lake Field is said to occur in Township 59 Range 2 southwest of Thompson and Soars Lakes on Elizabeth Settlement. Although some technical data has been gathered on it, additional research is required to define this deposit and locate others in the Cold Lake Region.

In April 1983, Suncor Ltd. briefly expressed an interest in defining, and in possible future partial development of the field on Settlement lands. They invited Elizabeth Settlement Council, Metis Federation representatives, and others to their existing Fort Kent Alberta operations to demonstrate equipment and methods which might be utilized to explore and/or develop the field should the company decide to pursue it. The potential for social and physical adjustment on the Settlement was also discussed.

However, Suncor subsequently decided not to pursue its plans to attempt to define and possibly develop this potential oil field for the foreseeable future. It is unknown if and when Suncor will ever do so.

There has already been a limited amount of natural gas and oil activity on the Settlement as a result of past activities. At the end of 1983 there were three potential gas wells, 10 abandoned wells (including one oil), one producing, and 8 location wells. The three potential gas wells are all located in Township 59 Range 1, while the bulk of the location wells are in Township 59 Range 2. (Figure 8)

A location well is one that has been licensed by the Alberta Energy Resources Conservation Board and is to be drilled. A potential gas well is one which has been drilled, tested, and capped but is capable of production.

The Mines and Minerals Division of Alberta Energy and Natural Resources administers the Mines and Minerals Act. This Division issues all leases required by oil companies to perform exploration and/or drilling operations on specified lands. Records of leaseholders on public lands and maps locating gas wells in the province are available through their offices.

The Alberta Energy Resources Conservation Board (ERCB) oversees energy management and development in Alberta respecting all oil, gas, oil sands, pipelines, electric energy, and coal. The Board also makes information available to the public in many formats on a broad range of subjects relative to its jurisdiction.

4.5 SAND AND GRAVEL

Sand and gravel is a major industrial mineral resource of Alberta which is required for road building and as a multi-use construction material. As one of Alberta's important non-renewable resources, it experiences by far the largest volume of production of any non-fuel mineral and is exceeded in value of production only by sulphur.

Sand and gravel is used in such vast quantities that easily accessible sources are rapidly being depleted and new deposits must be found. This resource is generally a high bulk, low cost material and thus it is advantageous to locate useful deposits in close proximity to where they are required.

On Elizabeth Settlement, much of the construction and road gravel comes from sources off the Settlement although it may be possible to develop local supplies. Figure 8 indicates the possible locations of sand and gravel deposits in and around the hamlet. One potential source lies east of Chandler Road and the easterly 'extension' of Settlement Road in 21-60-1-4. Another may be located west of Main Drive in 32-60-1-4.

One smaller, and one potentially extensive deposit may be located in Sections 35 and 36 in Township 60-1-4 north of Bates Lake. Small quantities of sand and gravel for local or personal use are being extracted from these sources but the lack of suitable road access hampers their more extensive development. Moreover, the full extent and quality of these deposits is largely undefined.

The availability of gravel supplies on the Settlement is important because it serves to reduce the costs of local construction projects. In addition, should reserves prove to be greater than projected needs on the Settlement, there may be opportunities to generate income from sand and gravel sales.

Examination of water well drillers' reports indicates the entire Settlement is underlain by alternate layers of glacial sand and gravel to a depth of 46 to 122 m (150-400 ft). As noted, in some locations these resources are close to the surface and can be readily and cheaply extracted. However, most of the resources are deeply buried and essentially inaccessible.

It is noteworthy however that all of the water well drilling activity and most of the development on the Settlement has occurred on the most northerly of the three Townships. Thus, most of the information on sand and gravel deposits on the Settlement is confined to this Township. Little is known of the mineral potential of the other two.

Given the very rolling and hummocky terrain which is more prevalent in the southerly two Townships, and that such terrain can on occasion be the source of aggregate, it is possible that additional discoveries of readily recoverable supplies of sand and gravel may be found there to supplement known sources. However considerable exploratory work and testing would be necessary to make determinations. Agencies such as the Alberta Research Council may be of assistance in this regard.

Figure 8

PHYSICAL RESOURCES

ELIZABETH METIS SETTLEMENT

LEGEND

Road	Rural Dwelling
Trail	Picnic Site
Cutline	Corral
Fenceline	Sand and Gravel Deposit
Power Transmission Line	Clear Area
Wet Area	Wooded Area
Compressor Site	Peat Moss Deposit
Location Well	Potential Gas Well
Producing Gas Well	Abandoned Well
Pipeline	

Sources: Elizabeth Metis Settlement, Metis Development Branch, Planning Branch, Energy Resources Conservation Board, Energy & Natural Resources, Alberta Power Ltd., Canada Land Inventory, N.T.S. 1:50,000 Series Mapping, Alberta Research Council Reports
Note: Boundaries Are Approximate.

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Scale

Rg.2 Rg.1 West of the 4th Meridian

Tp 60 Tp 59

Hutea Lake
Day Lake
Soars Lake
Thompson Lakes
Chandler Lake
Bobspring Lake

4.5.1 OBSERVATIONS

- The assistance of geologists may be helpful in the search for adequate and reliable sources of gravel.

- Any sand and gravel deposits which might be located could be maximized using the advice of geologists.

- Prior to the development and exploitation of gravel and sand resources, the longer term reclamation potential for the lands should be carefully considered.

- In utilizing any gravel resource, the longer term affects on the groundwater table(s) and water supply should be determined and evaluated, particularly where such resources are located in groundwater recharge/discharge areas.

4.6 PEAT MOSS

Commercial peat moss is used as a soil conditioner for lawns, shrubs, and gardens. The peat moss industry has experienced significant growth in Alberta where the largest reserves of the mineral are located. Total production in 1981 was 35,000 tonnes valued at 4.4 million dollars, much of which was exported primarily for horticultural use. However, between 1981 and 1984 the economic downturn in the country has

reduced demand for the material, forcing a number of companies to cease production.

As with sand and gravel, peat moss is considered a non-renewable mineral included under surface rights. It has been argued that since peat bogs are actively growing plant colonies, and peat is composed of dead vegetable matter, the commodity should not be identified as a mineral. Nevertheless because current bogs are 8-10 thousand years old, it is considered non-renewable, and therefore a mineral commodity.

Peat bogs tend to be located in low-lying poorly-drained areas where Black Spruce is the characteristic tree cover. While many parts of the province have been identified as having potentially marketable peat, only limited information is available to pinpoint potentially commercial deposits of peat on Elizabeth Settlement. Figure 8 illustrates very generally where such deposits might be located on the Settlement. Further study into the economic feasibility of commercial peat production and the extent of deposits on the Settlement is necessary.

There are several local and external factors which must be considered prior to deciding whether to develop a peat resource. Locally there must be all-weather access to the bog, a supply of natural gas or other energy source for drying, and an ample supply of sphagnum moss. External factors such as market demand, competition, distance to market, transportation costs, and financing would also have to be considered.

It is significant to note that peat bogs perform a very important function in the natural drainage regimen. Bog areas frequently serve as drainage retention zones, often complementing the groundwater distribution systems by acting as recharge areas. In addition, bog areas situated near rivers or in headwaters locations can act as 'giant sponges' to capture snowmelt and rainfall to be released gradually (as a discharge area), resulting in significant reductions in flooding, erosion and siltation. Water flows and levels in streams and lakes are more constant and reliable, along with the maintenance and improvement of wildlife habitat.

It is important therefore that site selection for any contemplated commercial peat development, consider all such factors.

4.6.1 OBSERVATIONS

- Should it be decided to pursue a peat industry on the Settlement the preparation of an economic feasibility study by qualified consultants should be carefully considered.

- The potential for land use conflicts (eg. grazing and wildlife habitat versus peat production) should be determined and addressed when considering whether and where the commercial production of peat should occur.

- Important components in any feasibility study regarding commercial peat production should be the longer term affects of peat removal on water regimens on the Settlement from a groundwater and surface water perspective.

4.7 DOMESTIC WATER RESOURCES AND SUPPLY

Prior to 1973, many residents of Elizabeth Settlement secured water for domestic use from a limited number of community wells located in the hamlet. Settlers hauled their own water from at least 2 bored wells to their residences where it was stored until required in the home. Water for stock and other agricultural purposes was occasionally taken from these wells, but was generally obtained from nearby lakes.

Over time, a small number of residents contracted privately to have wells drilled (or bored) on their lands, but most relied upon the community wells which were equipped with hand pumps, for their domestic water supplies. One of the community wells is located next to Rena Gadwa's dwelling on Sesame St. (103 St.), while another is on Recreational Boulevard (102 st.) near the home of August Cardinal. (Figure 9).

Both wells have undergone a number of tests over the years and are said to have good water quality and supply. Although a piped water system was installed in Elizabeth hamlet in 1983/1984, these two community wells will be retained for emergency purposes in case of temporary failure of the new system.

Figure 9

ELIZABETH SETTLEMENT HAMLET MAP

Legend

Existing Building
Water Well
Watermain
Valve
Plug
Hydrant
Water Service
Contour Line 120
Powerline

Scale
m50 0 50 100 150m

RACETRACK
103 Avenue
102 Avenue
101 Avenue
106 Street
105 Street
104 Street
103 Street
102 Street
Main Drive (101 St.)
RECREATION COMPLEX
WATER TREATMENT PLANT
WORKSHOP
SETTLEMENT OFFICE
LUNCHROOM
CHURCH
SCHOOL
Reserve
Archie Collins
Violet Houle
Albert Collins
Dan Paquette
Margaret Sinclair
Mary Lou Soloway
R. Cardinal
Terry Soloway
Bill Collins
Rena Gadwa
Ed Swan
Pat Swan
Glen Cardinal
Rodney Boucher
Walter Desjarlais
Doris Soloway
Fred L'Hirondelle
Clifford Cardinal
Joe Collins
Lorraine Collins
Vernon Soloway
Albine Jackfish
August Cardinal
110
115
120
125
130

NOTE: METRIC CONTOURS BASED ON A LOCAL, ARBITRARILY ESTABLISHED, BENCHMARK. CONTOUR INTERVAL 2.5 m

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4.7.1 WATER WELL PROGRAMS

In 1973, Alberta Environment initiated the Northern Water Supply Program to locate and provide new sources of potable water for northern Albertans. The residents of Elizabeth Settlement were able to benefit from this program in 1973 and subsequent years. Seventeen wells were completed the first year; twenty in 1974; while six wells were completed in 1975; for a total of forty-three. All wells were properly lined and sealed to prevent contamination, and equipped with electric pumps. Between 1978 and 1980 an additional thirteen wells were completed for a total of fifty-six, of which fifteen were bored. The remainder of the wells were drilled and completed with well screens and steel casing. In 1983 twenty-seven more water wells (including one dry hole) were drilled, properly encased, and electric pumps installed.

4.7.2 WELL YIELDS

Due to relatively low yields (4.55 - 13.64 litres per minute) (1 - 3 imperial gallons per minute) in many of the older, shallower wells (7.6 - 22.8 metres) (25 - 75 ft), those completed in 1983 have generally been deeper (30 - 87 m) (98 - 286 ft) with many excellent high yield wells having been obtained. Yields ranged from 18 to 205 litres/min (4 igpm to greater than 45 igpm) with most wells producing more than 32 litres/min (7 igpm). It is generally accepted that a well producing 9.1 litres/min (2 igpm or 2880 igp day) is satisfactory for domestic use.

Due to the high production rates of some of the wells the theoretical twenty-year well yield (Q20) calculations could not be performed since the production rate was greater than the pumping rate. (Note: a Q20 of 5 igpm basically means that water could theoretically be pumped from the well for 20 years at the rate of 5 Imperial gallons per minute (23 litres/min). Approximately 25% of the existing wells on Elizabeth Settlement have a Q20 greater than 10 igpm (45 litres/min) with at least 5 exceeding 100 igpm (455 litres/min). Table 1 indicates the ownership, location, Q20, depth, and date drilled, for water wells on Elizabeth Settlement where the Q20 exceeds 10 igpm (45 litres/min). Figure 10 indicates the location of these "high yield" wells.

Table 1
High Yield Water Wells on Elizabeth Settlement
(Q20 greater than 10 igpm (45 litres/min)
(well depth in feet)

Name	Location	Q20	Depth	Date
Willard Cardinal	181 Ranchero	15	98	1983
Wilfred Collins	180 Ranchero	12	111	1983
Rene Laroque	190 Whitemud	30	174	1983
Moses Swan	165 Whitemud	25	63	1974
Alex Cardinal	163 Chandler L. Rd.	150	64	1974
Gary Desjarlais	162 Chandler L. Rd.	86	93	1974
Albert Tourangeau	188 Settlement Rd.	23	43	1974
Harry Desjarlais	182 Settlement Rd.	13	50	1973
Norman Jacknife	161 Chandler L. Rd.	200	125	1974
Wilfred Swan	162 Chandler L. Rd.	11	119	1983
Edward Soloway Sr.	114 Bates L. Rd.	220	140	1974
John Tourangeau	127 Bates L. Rd.	265	160	1974
Jim Cardinal	128 Bates L. Rd.	14	110	1973
L. Desjarlais Jr.	136 LTD Drive	46	207	1983
Willard Cardinal	125 Bates L. Rd.	20	136	1974
Edward Desjarlais	150 Bates L. Rd.	70	132	1980
William Desjarlais	121 Bates L. Rd.	50	129	1974
Settlement School	123 Bates L. Rd.	60	164	1981
Theresa Desjarlais	120 Bates L. Rd.	50	135	1974
L. Desjarlais Sr.	106 Sandy Dr.	18	104	1973
Victor Daniels	189 Muskeg Hill Rd.	72	158	1983
Joe Collins	111 Main Drive	68	176	1983
Archie Collins	145 Rec. Blvd.	660	241	1973

Source: Interpreted from "Water Well Inventory Elizabeth Metis Settlement". Geoscience Consulting Ltd. 1984 for Metis Development Branch, Alberta Municipal Affairs

Note: Imperial measure shown for ease of reference

4.7.3 WATER QUALITY

In 1984, an inventory of 97 wells (of which 18 were abandoned) on the Settlement indicated that almost all settlers have at least one well in generally good condition which provides a reasonable yield of fair quality water. Some residents have four or more wells on their lands.

Results of water analysis on 35 wells in a 1982 study indicated the groundwater is of a Calcium Bicarbonate type with Total Dissolved Solid (TDS) concentrations varying from 575 milligrams/litre (mg/L) to 730 mg/L - well within maximum acceptable limits as per Alberta Drinking Water Standards of 1,000 mg/L. The Canadian Standard is 500 mg/L.

While from a health perspective the water is said to be excellent, it is very 'hard' (ie contains a high level of dissolved minerals - basically Calcium Carbonate) with tests ranging from 57 to 1263 mg/L, and an average of 409 mg/L. Canadian standards suggest 500 mg/L is the maximum acceptable limit for hardness.

Heavy concentrations of iron in the water may cause it to 'yellow', gives it an unpleasant taste, and is displeasing to many users. Dissolved iron concentrations in the 1982 samples ranged from 0.2 to 35.2 mg/L with an average for 35 wells of 5.9 mg/L. Maximum acceptable limits for drinking water is set at 0.3 mg/L, well below the tested results. Only six of the wells tested matched this standard, with the remainder substantially above. The iron content in the water therefore is extremely high, and generally unacceptable and objectionable to many users, most of whom have no means for treating the water to improve this particular quality.

Hard water can create 'sudsing' problems for soaps and detergents, as well as encrustation of well screens which can reduce yields and flows. Heavy concentrations of iron can cause staining of laundry and fixtures. The highest concentrations of Total Dissolved Solids, hardness, and iron were observed to occur in the wells with the lowest yields per minute. Conversely the lowest concentrations occurred in the wells with the greatest water yields.

Nevertheless the water can readily be treated with modern 'water-softening' systems to improve these qualities. However the water is used without treatment at all locations on the Settlement except for the community water supply.

4.7.4 COMMUNITY WATER SYSTEM

In 1983/84 a central water distribution system was installed in the hamlet (Figure 9) using the school well as a water source. The 50 m (164 ft) deep well has a Q20 rating of 60 igpm (273 Litres/min) and is an excellent source. A water treatment plant with a 73,477 litre (16,163 imperial gallon) reservoir was constructed adjacent to the school to treat the water prior to distribution. The water undergoes chlorination; chemical 'softening', and iron removal to enhance its qualities.

The treated water is distributed in a network of watermains within the hamlet on the basis of a grid road pattern. This is intended to allow for future residential infilling to occur in the hamlet, on a planned basis, where water supply is readily available.

Figure 10

WATER RESOURCES

ELIZABETH METIS SETTLEMENT

LEGEND

Road
Trail
Cutline
Fenceline
Power Transmission Line
Wet Area
Rural Dwelling
Picnic Site
Corral
Sand and Gravel Deposit
Clear Area
Wooded Area

Well Locations
High Yield Well Locations

Groundwater Probability
- less than 1 imperial gallon per minute
- 5-25 imperial gallons per minute
- 25-100 imperial gallons per minute

Sources: Elizabeth Metis Settlement, Metis Development Branch, Planning Branch, Energy Resources Conservation Board, Energy & Natural Resources, Alberta Power Ltd., Canada Land Inventory, N.T.S. 1:50,000 Series Mapping, Alberta Research Council Reports
Note: Boundaries Are Approximate.

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Scale
km 1 0 1 2 km

Rg.2
Rg.1 West of the 4th Meridian
Twp 60
Twp 50
Bates Lake
Day Lake
South Lake
Thompson Lakes
Chandler Lake
Bodogrive Lake

Individual water service connections to many of the residences in the hamlet have raised the possibility that several of the individual wells in the hamlet may be redundant and could be abandoned. Some residences may need to install or upgrade indoor plumbing prior to connection to this new water service since a 1982 report indicated only about 8 homes of about 80 on the Settlement had running water with septic tanks and tile fields. Most water is carried by hand into homes from wells as required.

4.7.5 WASTE WATER DISPOSAL

A sanitary sewer project with lagoon facilities is being examined as a possibility for the hamlet in subsequent years but no decision on the matter has yet been finalized. The Elementary School has its own water, septic tank and lagoon system which also serves three former teacherages and the store. It is anticipated that the school and teacherages, as well as all hamlet buildings and residences would hook up to the new communal system.

A septic tank program is also being considered for residences outside the hamlet in 1985-86. Should the program proceed, it will generate the need for the installation of indoor plumbing in several residences, and generally improve the quality of life for many.

4.7.6 HYDROGEOLOGY

Elizabeth Settlement is located on a thick deposit of glacial till (basically a silty clay with a mixture of pebbles). The till contains 'pockets' of mixed sand and gravel called 'lenses', as well as alternate layers of sand and gravel. The layers and lenses are the water-bearing formations. This mixed overburden reaches a depth of 50 to 125 meters (160 to 400 ft) to bedrock.

No suitable aquifers are present in the bedrock which is of the Lea Park Formation consisting of marine shales and siltstones, thus all wells are completed within the overlying sand and gravel layers and lenses. The latter were formed from a series of glacial advance and retreat movements over the area leaving numerous stagnant ice and meltwater (outwash) features, (some quite large) varying from well-sorted sand and gravel to minor gravelly layers.

In the examination of well core samples, several oxidized horizons were found in gravels and tills (unsorted materials) in the subsurface, indicating long intraglacial intervals. Evidence of these oxidized horizons is found in the high iron content found in many wells on the Settlement.

A north-south trending "buried valley", the Vermilion Valley, traverses two of the three Townships on the Settlement (Figure 10). Water well yields of between 114 - 455 litres per minute (25 - 100 igpm) are possible in this area. Table 1 indicates that all of the wells on the Settlement with a Q20 of 10 igpm and greater have been found within this buried valley.

East and west of the Vermilion Valley, yield possibilities are estimated at 23 - 114 litres per minute (5 - 25 igpm) which is generally quite satisfactory for most domestic or agricultural purposes.

4.7.7 OBSERVATIONS

- In order to maximize the efficiency of the new hamlet water system new residential development on the Settlement should be encouraged to locate in the hamlet area in accordance with an adopted hamlet plan

- In allocating lands for residential and/or farming purposes outside the hamlet areas, the potential availability of groundwater should be determined

- A regular program of water well maintenance could be established to ensure a reliable domestic water supply free of harmful contaminants.

- Mechanical water delivery into Settlement residences from adjacent outdoor wells, or the communal distribution system, could be considered.

- 'Conditioning' of domestic water supplies to reduce iron and hardness could improve its palatability, and should be considered on the Settlement

- Should a sewage lagoon system be contemplated for the Settlement, all existing and any new buildings and structures erected in the hamlet should be connected.

4.8 SOIL CAPABILITY FOR AGRICULTURE

4.8.1 SOILS QUALITY

The ability to carry on agricultural activities anywhere in the province (including Elizabeth Metis Settlement), is largely dictated by the quality of the soils. Soil quality can be affected by topography, drainage, and climate.

The most widely used system for classifying soil quality is the Canada Land Inventory - Soil Capability for Agriculture mapping program (C.L.I.) which rates the potential of soils for crop production on a scale of one (1) to seven (7). (Figure 11; Appendix 1). Soils rated one (1) are considered to be the best for crop production with few limitations, whereas soils rated seven (7) are considered to be the poorest, with very little or no agricultural capability. Organic soils, largely wet, boggy type soils, are also identified as a separate classification at the lowest end of the scale.

It should be noted that C.L.I. data is very general and should only be used until detailed soils analysis of each site under investigation for possible agricultural use is conducted.

Figure 11

AGRICULTURAL RESOURCES

With this system it is generally accepted that soils rated 1-4 are considered "better" agricultural lands, while soils rated 5-7 and those rated Organic, are considered to be "poorer" agricultural lands.

On Elizabeth Settlement there are no Class 1-3 lands, and although there are a few isolated pockets of Class 4, the predominant soils characteristic on the Settlement is Class 5 (Figure 11). These soils are generally not suitable for the sustained production of annual field crops, although with proper drainage, fertilizing, and the use of large farm machinery, the lands can be improved to produce a limited amount of feed grains. On Elizabeth Settlement these crops are Oats and Barley, with some hay production primarily for local livestock use.

4.8.2 SOILS TYPE

The primary soils type over the entire Settlement is Orthic Gray Luvisol (LaCorey series) which is characteristically a slightly acidic, fine grained, low fertility loam susceptible to erosion, due in part to a thin organic surface layer. These soils are dominant over much of this northeast region of Alberta, particularly between Kehiwin Lake and the Saskatchewan/Alberta border.

The natural vegetation on these soils is composed predominantly of trembling aspen, balsam poplar, paper birch, white spruce, alder and willow.

These soils usually retain sufficient moisture and are capable of producing reasonable yields of grain and forage crops with fertilization. Mixed farming, including the raising of livestock, may be best suited for farming these soils although the production of fresh vegetables may also be successful. Rough areas should be left for pasture purposes because of the topographic limitations.

As noted in Chapter 4, Section 4.2, virtually the entire Settlement has been affected by glaciation and is described in geological terms as a hummocky morainal plain (Figure 6). Much of the Settlement south of Bates Lake is generally not suitable for crop production due to high water tables and adverse topography (moderately rolling 9-15% slopes). The soil quality and capability has been affected therefore by these conditions since large pockets of poorly drained organic soils (peat) lie among a hilly rolling landscape. As such, the general agricultural use for this area is limited to woodlots and cattle grazing with the occasional location suitable for pasture and hay production.

Agricultural activities generally take the form of livestock production and mixed farming which occurs on the cleared lands north of Settlement Road and Bates Lake Road around the Hamlet. The topographic conditions there are less severe and the quality, type and distribution of the soils mean they have the potential to be improved by drainage schemes and using larger farm machinery.

4.8.3 OBSERVATIONS

- When allocating lands to residents, with either farming or non-farming experience, the agricultural capability of the lands should be considered

- When developing lands for non-agricultural purposes, those lands with the better agricultural ratings should be avoided wherever possible

- When clearing of the land is considered in order to expand the agricultural land base on the Settlement, only those lands with the better soils ratings and favourable topographic relief should be considered

- Given the limited amount of better agricultural lands on the Settlement, the lands should, whenever possible, remain in larger parcels in order to maximize the agricultural potential

4.9 AGRICULTURAL DEVELOPMENT

Due to a number of general factors, farming in northeastern Alberta on "marginal" agricultural land is a risky business with additional uncertainties not found elsewhere in the province. The number of frost-free days fluctuates widely and precipitation varies. Due to the low

farm population density, farm supply and farm marketing are more uncertain. Northern farm research is not as well developed as it is in southern Alberta. However, the need to carefully balance cereal crop production with forage production to maintain and enhance the productivity of gray wooded soils is well recognized. Similarly, the need to select early maturing varieties and cool climate species is understood.

4.9.1 SOCIO-ECONOMIC FACTORS

The important socio-economic factors which affect the success or failure of farming in any location include:

(1) land - farm size; fragmentation; percent improved land; distance to market

(2) labour - age; education and skills; expectations and other opportunities; part-time or full-time; productivity

(3) capital - income and cash flow deficiencies; credit sources available; mechanization; agricultural infrastructure; marketing organization; community infrastructure

(4) management - knowledge; technology and practices available; capacity to innovate or adapt; crop/livestock selection; intensive/extensive farming strategy

These factors are also important in the case of Elizabeth Metis Settlement when an assessment of its agricultural capabilities and potential is being considered. About one-third of the Settlement's land base has been allocated by Council to Metis families, largely on the basis of quarter-section allotments, (Figure 12). However there are only about 12 families actively involved in farming on the Settlement. For the most part, farming activities occur north of Settlement Road and Bates Lake Road, with some attempts being made to establish farming operations along Ranchero Drive.

Nevertheless agriculture still plays an important economic and cultural role on Elizabeth Metis Settlement, where small-scale mixed farming consisting of a number of small livestock, as well as garden plots for personal consumption, is practised. Others are reliant on small scale cow-calf operations for income. Many residents, including those engaged in agricultural activities, pursue non-farm employment either on or off the Settlement to supplement their general income.

The opportunity for other non-farm employment both on and off the Settlement has positive and negative implications to agriculture. On the one hand, it may discourage residents from farming as intensively as possible and take farmers away during crucial periods. On the other hand, it can provide much needed capital to put into the farming operation.

Given the size of the farm units on Elizabeth Settlement it may be that most of the farmers are part-time in that they may receive much of their income from off-farm employment. This could have a tendency to reduce the intensity to which the land is farmed and make farm credit more difficult to obtain.

Capital-related factors such as credit, capital accumulation, capital expenditures and investment returns are important considerations. The establishment of new farms and increased mechanization requires new capital inputs. Established settlers who do not plan to expand their operations may not be as concerned as others about capital and credit. It is however of concern to settlers starting new farming enterprises, or those enlarging existing ones. Bank credit is not generally available to them (or to other settlers) because they do not hold title to their land.

While some capital could be realized from the sale of farm products and/or from off-farm employment, it is still difficult to acquire adequate capital to create a viable farming operation.

4.9.2 FACTORS INFLUENCING PRODUCTION

The growing season at Elizabeth is about 100-120 days, and rainfall is between 30.5 and 35.5 cm (12 and 14 inches) per year. This relatively short growing and frost-free season makes the raising of wheat and an Argentine variety of Canola somewhat risky. Consequently because of climate limitations (soil fertility, slope, and drainage can present other limitations) Barley, Oats, Polish Canola, and forages are preferred crops since they mature earlier.

Much of the land on the Settlement does not drain properly, thereby resulting in sloughs and pot-holes. Of the approximately 25,642 hectares (63,360 acres) within the Settlement boundaries, only about one-fifth or 4,856 to 6,475 ha (12,000 to 16,000 acres) may be considered as having some "viability" for agricultural purposes, most of which must be cleared and improved before it can be used.

Due to physical and other limitations the use of machinery is intensifying on the Settlement, with 10 tractors, 2 swathers, 1 combine and several assorted implements (discs, plows, etc.) currently in use. As noted previously, oats and barley for green feed are the basic crops grown along with timothy, alfalfa and brome for tame hay. Limited quantities of barley have been sold as a cash crop and trucked to market in Grand Centre, but most grains grown on Elizabeth Settlement are used as feed for the settlers' livestock.

Typically, a field is held in grains for three years, is put in forage for three, and then is left in summer fallow for the next year. This process is then repeated in attempts to preserve or increase the nutrient content in the soil.

Another factor which may limit agricultural development is the large number of smaller-sized grain and tame hay fields. These small, irregularly-shaped fields have been developed largely as a result of topographical constraints. Fields of less than 40.5 ha (100 acres) are not viewed as viable farm units.

There are currently about 75 relatively small irregularly shaped cleared areas used for grain or hay production (tame or native) on Elizabeth Settlement. They range in size from approximately .20 to 56.7 ha (one-half to 140 acres) with the majority about 20.2 ha (50 acres) in size.

The use of these fields and cleared areas varies from year to year and season to season, each open to a variety of functions from livestock, to crop raising, to fallow, to regeneration of natural vegetation. In addition, new areas are being cleared annually thus either adding to the total cleared areas, or replacing those lost to regeneration. In view of these activities and the persistent changing circumstances, it was considered impractical to gather data examining the specific use carried on in each of the cleared areas since the data could not be compared on an annual basis.

Native hay meadows are described as unimproved pasture, areas which may have been recently cleared, or have largely regenerated back to a natural state. These meadows are important in the support of livestock grazing particularly as a supplement to the limited tame hay production (See Figure 22 - Transportation, Section 5.5.6).

In addition to the above, Elizabeth Settlement has a partially fenced community pasture occupying some 6 Sections of land lying largely between Soars and Thompson Lakes, and extending south to Chandler Lake. While the land is largely unimproved, Settlement residents are entitled to graze their cattle on the lands as desired (Figure 12).

4.9.3 LIVESTOCK INTERESTS

The Soars Lake Cattlemen's Association, a group of Settlement residents who have joined together for common livestock raising benefits, have secured a grazing lease for approximately 48 Sections of Settlement lands.

Figure 12

LAND ALLOCATION

ELIZABETH METIS SETTLEMENT

LEGEND

Road
Trail
Cutline
Fenceline
Power Transmission Line
Wet Area
Rural Dwelling
Picnic Site
Corral
Sand and Gravel Deposit
Clear Area
Wooded Area

Land Allocated To Settlers (To June 1984)
Soars Lake Cattlemens Association #1 Lease
(Term - January 1 1983 To March 31 1985)

Sources: Elizabeth Metis Settlement, Metis Development Branch, Planning Branch, Energy Resources Conservation Board, Energy & Natural Resources, Alberta Power Ltd., Canada Land Inventory, N.T.S. 1:50,000 Series Mapping, Alberta Research Council Reports

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Scale
km 1 0 1 2 km

Rg.2 Rg.1 West of the 4th Meridian

Tp 60 Tp 59

Recreation Grounds
Cemetery
Blake Lake
Day Lake
Soars Lake
Thompson Lakes
Chandler Lake
Redmond Lake

The lease was approved by the Settlement Council in January 1
extends until March 1985, and gives the Association exclusive ri
to grazing privileges on the leased lands (Figure 12). Council
improved some parts of the leased area but the majority of the l
are largely unimproved and partially fenced.

While the Soars Lake Cattlemen's Association grazes approximate
5 head per member, it occasionally will graze non-members' cattl
a small fee to offset range rider, fencing, veterinarian and other
of operation. Occasionally another 1500 head or so may be range
this process which provides seasonal employment for about six pers

The residents of the Settlement also recognize the potential for
stock, given the limitations for conventional agriculture on the
base. Cattle have traditionally been kept on Elizabeth, and until a
1977 the Metis Development Branch operated a government her
the Settlement and provided residents with access to breeding sto

Settlers could 'borrow' cows from the herd for up to five years and
responsible for caring for and breeding them during that time. At
end of the lending period they returned to the government herd
number of cows they had borrowed, and they then owned all of
calves that had been produced in the process. With the terminatio
the program, the rising costs of feed and replacement stock mad
difficult to replace cattle which had been sold, and a number of opera
abandoned the livelihood. The herds which had been built up from
head in 1975 to 324 in 1977 began to decline slightly.

In 1978 it was determined that at least one-third of the residents kept cattle; one-quarter had up to 10 head; and 3 families had 20 or more; with the largest herd being 78. Thus, the strong interest in cattle production persisted, and through perseverance, initiative, and investment, there are said to be over 1000 cattle on the Settlement in 1984. (Note - livestock census was discontinued in intervening years).

Horses are kept extensively on the Settlement and likely total some 50-60 head, although accurate figures are not available. Some are sold as saddle or work horses, but the large number reflects the historical and cultural pride in horse ownership among the Metis. Smaller livestock such as chickens, swine, and goats are kept by individual settlers for their own use.

4.9.4 AGRICULTURAL PLANNING AND PROGRAMS

Because existing farms are small in size and fragmented, (due to irregular clearing) future decisions regarding expansion of the Settlement's agricultural base may have to consider consolidating existing land allocations into larger more viable units and clearing larger tracts. The cost of bringing bush land into production on the Settlement in 1977 was $100 to $125 per acre. Currently however costs have dropped to between $85 to $100 per acre. Nevertheless it still requires three to five years to develop the land to the stage where a return on investment is realized.

In the present land clearing program on Elizabeth Settlement, from 81 to 121 ha (200-300 acres) are cleared each year. The vegetative and

other materials are removed from the lands by bulldozer in January/February of one year and "broken" in the spring of the following year. The amount of land targeted for clearing in any one year may depend upon the Settlement's perceived need and the funds available. Currently however, soil samples are not taken to determine the agricultural capability of the land to be cleared, nor is the advice of the District Agriculturist sought to determine fertilization needs and cropping choices. If however, such practices were implemented, they could be of benefit over the short and long term to the Settlement.

The labour-related factors of age, education, skills, expectations, other opportunities, part-time or full-time farming, and productivity also affect the future of agricultural development. It would appear that the settlers on Elizabeth Settlement who are involved with farming are younger (average age approximately 30) than the provincial average (average age approximately 47).

While this is a positive sign in one respect, few of the farmers have taken formal agricultural training, although many have experience with cow-calf operations and horses and possess a strong desire to succeed.

Success in farming requires a proficiency in a variety of farm-related skills. The farmer today must be a proficient manager, bookkeeper, able to repair equipment, construct buildings, and recognize illness in and occasionally treat sick animals.

Educational institutions such as the Alberta Vocational Centre at Lac La Biche, Grouard, and Vermilion could provide some of the courses relevant to farming and other vocations. The Lac La Biche Centre has a previous history of involvement with the Settlement, having responded to several Settlement requests for educational assistance, with at least one program having been conducted at Elizabeth..

Another program, jointly funded by Alberta Agriculture and Alberta Advanced Education and Manpower, is the Green Certificate Farm Program whereby a younger farmer works for an established farmer to learn new skills. The costs of this apprenticeship program in terms of the trainee's wages are jointly paid by the trainer farmer and the two sponsoring provincial departments. While no candidates from Elizabeth Settlement have yet enrolled in the program, there are renewed interests in its benefits and prospects for 1985 86.

The Council and settlers on Elizabeth are progressive minded and prepared to investigate ways and means of encouraging the expansion of agricultural activities on the Settlement. In 1982 the Council, with the cooperation of the Federation of Metis Settlements and Rural Venture Incorporated (a Minneapolis- based agricultural development firm), prepared an agricultural development strategy designed to more effectively utilize the land base.

The development strategy was intended to provide settlers the opportunity to improve existing skills in the areas of livestock raising and farm management, and to develop new skills in other profitable areas of agriculture (eg. vegetable farming). It was also intended that the program be implemented using current techniques and technology in computers and education, including research. However, as of 1984 the development strategy had not yet been implemented on the Settlement.

Local Agricultural Service Boards provide an opportunity for sharing ideas and knowledge with other area farmers. They also provide access to agricultural grant structures which assist in funding certain farming or farm-related activities. These organizations can benefit the local farming community including the Settlement farmers

4.9.5 OBSERVATIONS

- When allocating land to settlers, those with an aptitude for and an interest in a farming career could be directed to the better farmland areas where larger parcels of land may be available for agricultural success

- The advice of professionals working with knowledgeable residents may be of assistance in determining and implementing an agricultural development program for the Settlement

- In order to reduce the costs of agricultural production, the co-operative purchase, sharing and/or leasing of new or used equipment may be helpful

- The establishment and maintenance of grazing areas on the Settlement should not interfere with prime wildlife areas so that two strongly desired land uses do not conflict

- Those settlers with an interest in agriculture should be encouraged to pursue formal training to supplement an extensive practical knowledge, so that the opportunity for farming success is increased

- Membership in local Agricultural Service Boards could be pursued in order to benefit from the sharing of knowledge and ideas relative to farming.

- Prior to opening new land for farming, the soils should be sampled and tested to determine their suitability for agricultual purposes, and expert advice should be sought to supplement current local knowledge regarding cropping choices and methods.

- The services of a resident full-time agricultural specialist may be of benefit to the Settlement in order to plan for the longer term agricultural future.

4.10 FORESTRY

Elizabeth Metis Settlement is situated in the boreal mixed wood forest region of Canada and has a mixed forest cover. The major tree species include trembling aspen, paper birch, alder, white spruce, balsam (black) poplar (also known as black bam), willow, black spruce, tamarack, and jack pine.

A history of forest fires have destroyed the previously mature stands of softwoods and hardwoods, and consequently Aspen, as a primary succession species, is the most common tree cover on the Settlement. White spruce and fir as remnants of the mature stands, tend to occur in isolated pockets, largely remote from the hamlet area.

In addition to the natural burning process, soil conditions influence the type of tree cover on the Settlement. Jack pine is most frequently encountered in sandy, well-drained areas. In wet, organic, locations, black spruce is most common, as well as tamarack, birch, and willows.

The information on forest capability in this section has largely been adapted from the Canada Land Inventory (C.L.I.) Forest Capability maps. This classification system separates land into seven Classes with reference to their ability to grow commercial timber. Class one lands are considered the best lands with few or no limitations, while Class seven lands are considered to be the poorest lands with the most severe limitations. The productivity Classes are expressed in terms of the mean annual increment (ie. the amount of additional growth which is added to the tree) of the best species adapted to the site.

Class 3 is considered to be the highest mappable Class in Alberta and has moderate limitations due to climate. There are no Class 1-3 lands on the Settlement. Class 4 lands, which are predominant over approximately 80% of the Settlement (Figure 13; Appendix 2), also have moderate limitations due to climate, and low soils fertility associated with drainage and topographic problems.

These factors therefore may have the effect of limiting the potential for commercial timber production which might result from planned forestry and reforestation programs on the Settlement. The potential productivity for this category ranges from 3.6 to 4.9 cubic meters per hectare per year (51 to 70 cubic feet per acre per year).

Pockets of Class 5, 6, and 7 lands have also been identified on the Settlement. One large band of 70% Class 5 lands extends in a broad arc from just north of Soars Lake in an easterly and south-easterly direction to the Saskatchewan border (Figure 13). These lands largely flank Ranchero Drive and are heavily sprinkled with pockets of wetlands and bog.

Low fertility, moisture deficiency, wetness, and soil structure are the dominant limitations on Class 5 lands for white spruce and jack pine.

Productivity on lands of Class 5, 6, and 7 in the area of the Settlement generally range from 0.7 to 3.5 cubic metres per hectare per year (10 to 50 cubic feet per acre per year). These three Classes are found in areas of the Settlement which are subject to high water tables, flooding, and poorly drained organic soils. As an example, 90% of a six-Section tract of land south of Bates Lake and Bates Lake Road is rated as Class 7 lands due to moisture surplus problems which are clearly identified by topographic interpretation and symbols (Figure 13).

Limited harvesting of forest products occurs on the Settlement for fenceposts (Black Spruce, Tamarack), firewood (Poplar, Birch), and occasionally rough lumber. A variety of other products using existing forest stocks could also be manufactured – i.e. Jack Pine for shingles; Poplar and White Birch for rough pallets and pipeline blocking; young Jack Pine as rails. In addition, areas planted to spruce could be harvested relatively soon for Christmas trees. In the past, a sawmill operated on the Settlement southwest of Chandler Lake but is no longer in use. If a quantity of lumber is required, residents may occasionally rely upon a portable sawmill which is rented for the occasion and then returned.

Figure 13

ELIZABETH METIS SETTLEMENT

LEGEND

Road
Trail
Cutline
Fenceline
Power Transmission Line
Wet Area
Rural Dwelling
Picnic Site
Corral
Sand and Gravel Deposit
Clear Area
Wooded Area

Capability Classes

Moderately Severe Limitations 4
Severe Limitations 5
Severe Limitations 6
Severe Limitations/No Commercial 7

Subclasses

Low Temperatures H
Soil Moisture Deficiency M
Combination Of Soil Limitations S
Soil Moisture Excess W
Combination Of M And W X

Tree Species Indicators

Black Spruce bS White Spruce wS Jack Pine jp

Sources: Elizabeth Metis Settlement, Metis Development Branch, Planning Branch, Energy Resources Conservation Board, Energy & Natural Resources, Alberta Power Ltd., Canada Land Inventory, N.T.S. 1:50,000 Series Mapping, Alberta Research Council Reports

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Scale

Rg.2 Rg.1 West of the 4th Meridian

Tp. 60 Tp. 59

Recreation Grounds Cemetery Bates Lake Soars Lake Bay Lake Thomas Lake Chandler Lake Beaverhill Lake

FORESTRY RESOURCES

The future viability of forestry on Elizabeth depends upon good forest management. This would include timber inventories and the establishment of annual cuts to ensure an orderly harvesting of the resource.

Afforestation in selected areas with suitable commercially desirable tree species is a forest management option which helps to ensure the availability of future timber stocks. Since it frequently is a long time between the start of an afforestation program and the first cutting, these programs must be carefully planned with the assistance of the District Forester, and begun as soon as possible after decisions are made to proceed.

Frequently soils with good capability for forestry also have a good capability for agriculture. Areas of the Settlement where forest management programs might be pursued should be located where they would not conflict with proposed or future agricultural activities.

4.10.1 OBSERVATIONS

- Where desired, trained personnel working with knowledgeable residents, could be encouraged to determine whether and where on the Settlement a long term commercial afforestation project could be established.

- Trained foresters could be requested to assess if and where on the Settlement lumber for local consumption could be successfully produced over the longer term.

- The preparation of a forest management and utilization plan for the Settlement could be prepared using the advice of trained persons working with knowledgeable residents.

- Any forest management and/or utilization plans should not conflict with the long-term agricultural goals of the Settlement.

- Rough lumber for local consumption might be obtained at reasonable cost by renting a portable sawmill and related equipment, as required.

4.11 WILDLIFE RESOURCES

From an historical and cultural perspective, fishing, hunting and trapping have always been important to the Metis people on Elizabeth Settlement. This importance was recognized in the Metis Betterment Act which gave the Metis special privileges for the taking of fish and wildlife on the Settlements. Under the Act it is illegal for non-members to hunt or fish on Elizabeth Metis Settlement.

Hunting is very popular, with about 50% of the adult males on Elizabeth involved, largely on a part-time, generally recreational basis.

It has been estimated that approximately 50% of the meat consumed on the Settlement comes from local wildlife resources. While there are obvious economic benefits associated with these activities in terms of

domestic food supplies, the cultural and recreational importance is perhaps the most significant. Occasionally members may travel to other parts of the province to participate with friends in recreational hunts.

4.11.1 UNGULATES

Elizabeth Metis Settlement contains excellent habitat for a variety of wildlife such as beaver, coyote, goshawks, eagles, muskrat, etc., and is particularly good for ungulates. Moose, mule deer, and white-tailed deer are abundant because of favourable upland habitats located throughout the Settlement. High densities strongly indicate an abundance of upland browse production and availability due to plant succession species, composition, and diversity.

Moose are also known to occasionally utilize lowland shrubs for browse; calf on muskeg edges; and feed on aquatic vegetation. Aquatic vegetation is normally a very small part of moose diet and is consumed at certain times probably to provide specific nutrients not adequately supplied by heavily consumed plant species. The importance of aquatic vegetation varies between moose populations.

Characteristically, moose tend to stay within their home range year round, unless extreme winters force them to other areas where greater shelter and less snow prevail. This may account for some observations on the Settlement that although the number of moose appear high, they seem to be migrating through the area on occasion.

A "home range" for a moose is the area an animal uses over a defined time period (i.e. season, year, lifetime). Generally in North America, moose home ranges are usually less than 10-12 square kilometres per year and rarely exceed 5-10 square kilometres per season. However, annual movements of 30-40 kilometres have been reported.

Since man's activities frequently conflict with the suitability of an area for wildlife production, recent pressures to range cattle in the higher capability areas could have undesirable affects on long-term moose populations. For example, while residents indicate that moose hunting is good in the southeast portion of the Settlement, areas to the west may be affected by the ranging of cattle and frequent drives.

In terms of animal densities, an aerial survey of Wildlife Management Unit 500 (which includes Elizabeth Settlement) was conducted in January/February 1979 by Alberta Fish and Wildlife. The survey determined that there were approximately 1.90 moose per square kilometre on The Settlement. This was substantially better than the estimated 0.70 moose per square kilometre off the Settlement nearby. However, a subsequent aerial survey conducted in December 1981 indicated a decline in moose density to 1.36 per square kilometre on the Settlement and 0.24 per square kilometre off the Settlement.

Moose densities were greatest in aspen/spruce regrowth and dense aspen habitat types. Large areas of aspen-spruce regrowth on the Settlement probably accounted for some of the increased numbers of moose on Elizabeth as opposed to elsewhere in the region.

Elizabeth Settlement Council, is concerned that an apparent recent decline in the numbers of moose coupled with current levels of hunting activity (a popular pastime by many residents) may affect long term moose populations on the Settlement. In response, Council has established a moose hunting quota for Settlement residents. Only two (2) moose per family, and one (1) moose per single adult may be taken in any one year.

Deer are not regulated in this fashion, and may be harvested as needed. In addition, Council is considering the implementation of a big game wildlife sanctuary on 6-8 Sections of land at the southerly limits of the Settlement south of Chandler Lake. This is a particularly forward-thinking decision.

Both the white-tailed and mule deer (like the moose) are browsers who thrive on shrubs, buds, and bark. White-tailed deer are most commonly found in areas with deciduous tree cover while the mule deer prefer a conifer habitat. Given adequate food supplies, both species will stay within a "home range" of about 2.6 square kilometres (one square mile).

In the 1979 aerial survey noted previously, it was estimated that white-tailed deer densities on Elizabeth Settlement were 1.20 per square kilometre, and 1.40 per square kilometre outside the Settlement. However, by December 1981 the densities had improved on the Settlement to 1.36 per square kilometre and declined to 1.20 per square kilometre off the Settlement.

Figure 14 (Appendix 3) indicates that according to the Canada Land Inventory (C.L.I.), most areas on Elizabeth Settlement have a moderate to high capability for ungulates (moose, elk, deer). A broad area south and west of Soars and Thompson Lakes and around Chandler Lake, has been identified as Class 2, meaning this area should have excellent habitat with few limitations for ungulate production.

A second broader area extending south-easterly from Settlement Road through Day and Redspring Lakes respectively is identified as having Class 4 capabilities. This means that there may be some moderate limitations to ungulate production, but these are largely due to soil fertility (and hence food production) problems associated with extensive wetland areas.

Council reports that elk are either rare or non-existent on the Settlement, although the habitat favours their production. On nearby Kikino Metis Settlement a project involving the raising of buffalo and elk for local pursuits and possibly "game ranching", has been established. Should the results of this project prove to be beneficial, it is possible that elk could become established on Elizabeth Metis Settlement if animals were available and a management program established by Council and appropriate authorities.

4.11.2 TRAPPING

Trapping on the Settlement is a part-time pursuit which is conducted on a seasonal (winter) basis. Approximately ten trappers, as residents

of Elizabeth, pursue animals such as beaver, muskrat, coyote, wolf, mink and others. The revenue generated from this activity serves as a supplementary source of income for those involved. While trapping is generally confined to winter months, occasionally troublesome coyotes or beavers may have to be pursued at other times to protect calves or eliminate flooded fields or pasture.

Since it is not necessary for settlers to register traplines with Alberta Wildlife, no figures are available for numbers and types of pelts taken on the Settlement. However, local wildlife officials advise that lands on Elizabeth Settlement and in the region, provide good habitat for desired fur-bearing species.

From an historical and cultural perspective, trapping has always been important to Elizabeth Metis people. Thus it would appear that with continued favourable habitat conditions, this activity will continue to be an integral part of the Settlement's fabric for many years to come.

4.11.3 FISHING

Fishing is primarily recreational on Elizabeth Metis Settlement – no commercial fishing occurs. Pike (Jackfish), perch, and suckers are caught, with Bates Lake, Redspring Lake (a fairly deep lake), and Soars Lake being the primary sources.

Regulations allow only Settlement residents the right to fish on Elizabeth, with Alberta Fish and Wildlife setting limits and issuing licences. The sale of fish is not permitted as it is intended for local consumption. As in other parts of the province, creeks vital to the spawn are closed to fisheries harvest during the spring runs.

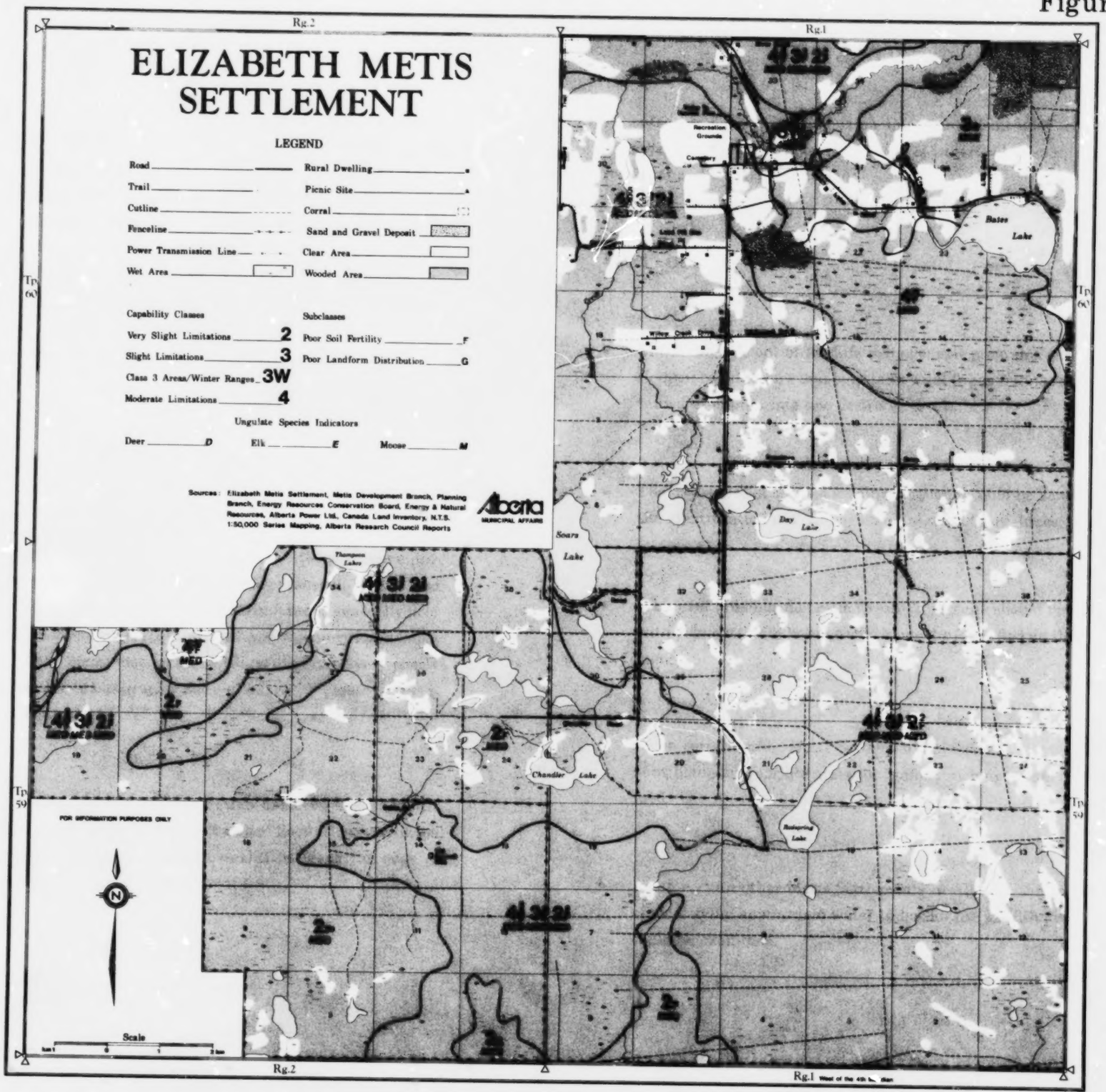
Generally, Settlement members can secure a Metis Domestic Licence which allows them to fish 95 m (312 ft) (one net) of gill net in waters on, or adjacent to the Settlement. The adjacent waters are those which may form part of the Settlement boundary such as Thompson or Soars Lake. All of the fish caught under this licence (maximum 45 kg or 99 lb) must be used for domestic consumption.

Commercial fishing licences may also be obtained by Settlement members for waters on or adjacent to Settlements where commercial fishing quotas have been established (and are available) by the province. No quotas have been established for lakes on Elizabeth so no Commercial licences have been issued to members of this Settlement.

At present, game fish farming is not possible on lands set aside as Metis Settlements because of the wording of Alberta Regulation 149/70(5). This regulation provides that game fish farming can only take place within bodies of water surrounded by "private" lands. However Item 16 of the Fisheries Policy Section of the Alberta Energy and Natural Resources' Fish and Wildlife Policy for Alberta specifically encourages fish farming activities on Metis Settlement lands. This apparent contradiction in regulatory/policy process is currently being resolved.

Figure 14

UNGULATE RESOURCES



In 1982 the Minister of Energy and Natural Resources indicated in the province's "Fish and Wildlife Policy for Alberta" that the province will ... "encourage an environment which fosters a viable fish farming industry on private lands and Metis Settlements". Consequently with the anticipation that Alberta Regulation 149/70(5) and/or the Energy and Natural Resources' Fisheries Policy may be amended, the Settlement may wish to explore the advantages of commencing fish farming activities. In this regard, interested Settlement members might wish to secure advice and assistance from Alberta Fish and Wildlife personnel in the assessment of lake and stream capacities for such a development venture.

4.11.4 WATERFOWL

As a result of the many wetlands areas on the Settlement, some production of "local" ducks such as Mallards (Greenheads), Pintail and Teal occurs, but their numbers are not significant due to generally poor habitat conditions. According to the Canada Land Inventory Land Capability for Waterfowl maps, most of the Settlement is rated very poorly (Classes 5 and 6) due to topographic and soil infertility problems (inadequate food production).

Nevertheless, a small pocket of Class 2 lands has been identified just southwest of Soars Lake and north of Chandler Road. However, it too suffers from a lack of optimum marsh conditions along the edge of watered areas.

As noted previously, hunting is an important element of the Metis lifestyle, and residents enjoy the pursuit of waterfowl species as a recreational and dietary supplement.

4.11.5 OBSERVATIONS

- The establishment of wildlife management programs on the Settlement could ensure that long-term wildlife populations are maintained at appropriate and desirable levels.

- The assistance of trained wildlife personnel could be beneficial in the identification and management of wildlife resources.

- Wherever possible, domestic livestock pursuits should not conflict with prime wildlife habitat which may be identified on the Settlement.

- As on certain other Metis Settlements in Alberta, the possibility of utilizing appropriate areas for "game ranching" could be examined.

- As on certain other Metis Settlements in Alberta, the possibility of identifying appropriate water bodies for use as "fish farm" sites could be examined.

4.12 OUTDOOR RECREATION CAPABILITY

Elizabeth Metis Settlement appears to have good potential for outdoor recreation activities geared to the Metis lifestyle. The variety of terrain; extensive wildlife; several trails and cutlines allowing access to interior and remote landscapes; and interesting/useful shorelines and waterbodies all contribute to this desirable resource.

This potential is supported by the Canada Land Inventory (C.L.I.) Land Capability for Recreation mapping series which indicates that the Settlement appears to have some unique and desirable features for outdoor recreation purposes. While the C.L.I. series appears to indicate that much of the Settlement has a lower capability for highly intensive outdoor recreation use at the human scale, it has good potential for lower intensity, dispersed useage.

Given the relatively lower population levels on the Settlement, the land base is therefore capable of providing a multitude of desirable outdoor pursuits from trail riding, to wildlife activities, to fishing, to family beach activities along selected lakeshores.

In addition, there are two locations with good suitability for viewing landscapes and wildlife (moderate capability C.L.I. 4) on the Settlement. One location is southwest of Thompson Lake, the other is midway between Chandler and Redspring Lakes.

The better lakeshore lands on the Settlement from a more intensive outdoor recreation perspective are located along the southerly shores of Thompson and Soars Lakes (Classes 3, 4, 5). Bates and Redspring Lakes have a more limited capability (C.L.I. 5), while the latter is largely inaccessible except on horseback. (Figure 15; Appendix 4)

The southerly shore of Thompson Lake has reasonable potential for wildlife interaction with good access to the shoreland. Other parts of this shoreline may be suitable for family beach activities such as swimming and boating.

4.12.1 SOARS LAKE

The land around Soars Lake appears to have the most shoreland recreation potential. The shoreline ranges from Classes 3 to 5 and is suitable for intensive recreation activities such as family beach activities, picnicking, overnight camping and viewing wildlife. (Figure 16; Appendix 4)

Currently the shorelands of Soars Lake are in a largely natural state with a small picnic area developed at the southerly end. Camping on a small scale (ie. 3-4 families) could be accommodated under present circumstances, but greater clearing of wooded shorelands would be required if more persons were to use the setting. Access for boating activities is quite favourable and angling in the relatively deep waters is said to be good.

Figure 15

SHORELAND CAPABILITY FOR OUTDOOR RECREATION

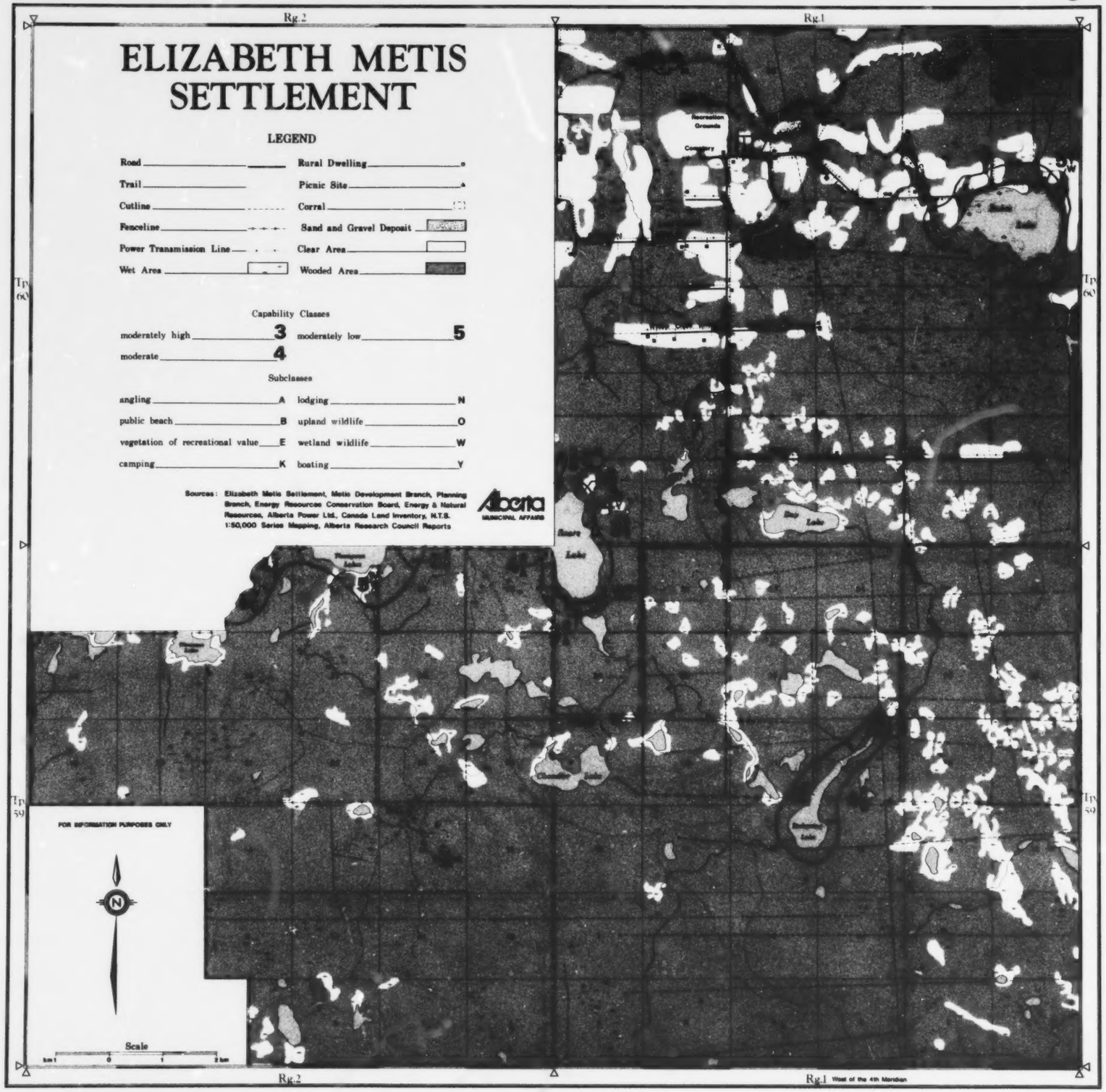


Figure 16

SHORELAND CAPABILITY FOR OUTDOOR RECREATION

ELIZABETH METIS SETTLEMENT

LEGEND

Corral
Road
Trail
Cutline
Fenceline
Picnic Site

Capability Classes

moderately high 3
moderately low 5
moderate 4

Area of Soars Lake outside Settlement Boundary

Subclasses

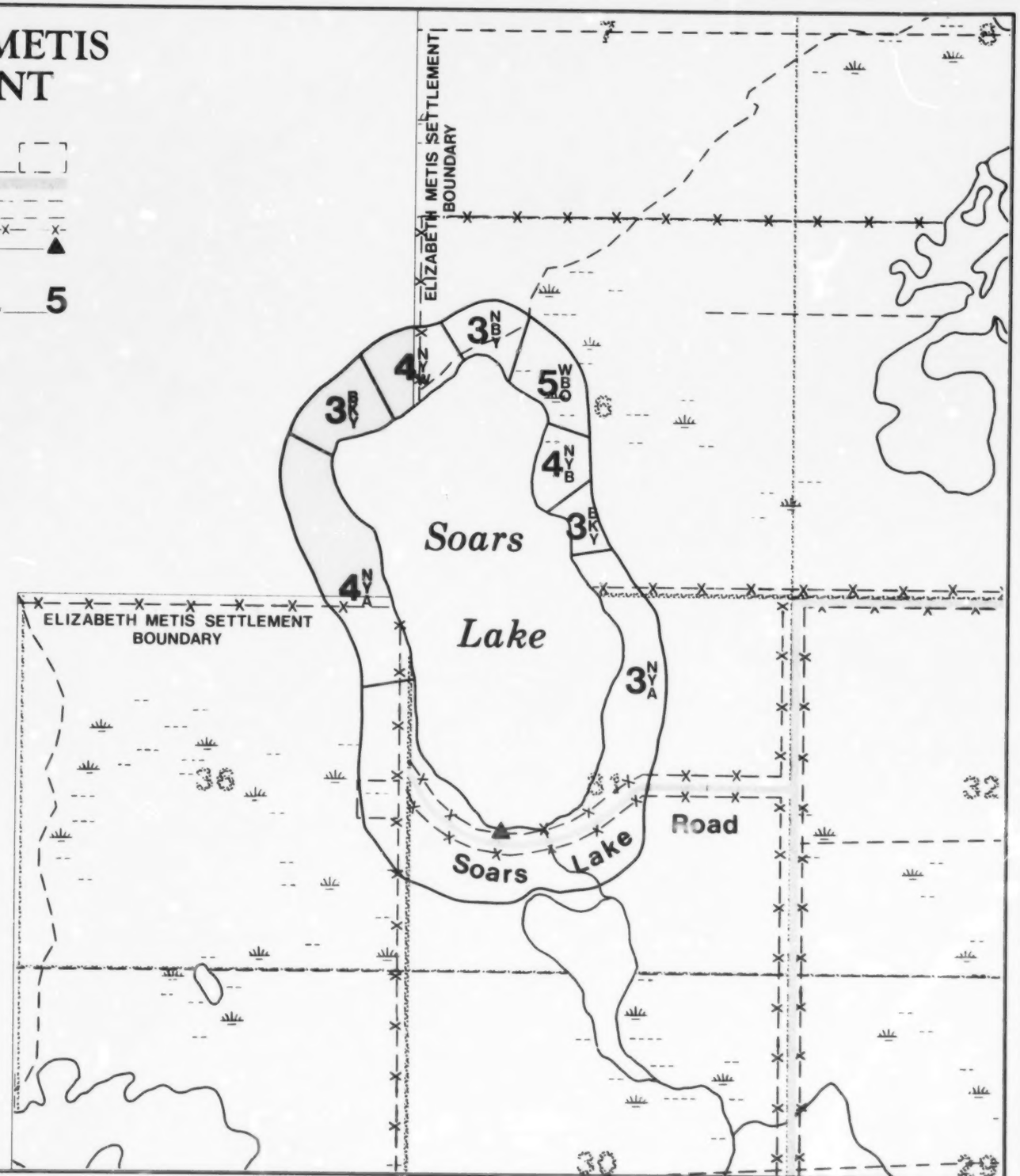
angling	A
public beach	B
vegetation of recreational value	E
camping	K
lodging	N
upland wildlife	O
wetland wildlife	W
boating	Y

Scale
km .5 0 .5 km

FOR INFORMATION PURPOSES ONLY

Alberta
MUNICIPAL AFFAIRS

Sources: Elizabeth Metis Settlement, Metis Development Branch, Planning Branch, Energy Resources Conservation Board, Energy & Natural Resources, Alberta Power Ltd., Canada Land Inventory, N.T.S. 1:50,000 Series Mapping.



In June of 1984, Settlement Council was considering the possibility of 'subdividing' the Soars Lake shoreline so that residents could pursue more personalized intensive recreational pursuits such as cottaging, boating and extended camping. Almost all of the Soars Lake shoreline on the Settlement appears to be suitable for these purposes, except for lands in NW 6-60-1-4. However particular care must be taken not to destroy the natural features of the lake by 'population overloading'; vegetation removal; and/or water contamination. At the time of writing however, Council had not formulated a firm decision whether to proceed with the 'lotting' proposal for Soars Lake.

4.12.2 OBSERVATIONS

- In any development of the land base for outdoor recreation purposes, access to the desired areas by all members of the Settlement should be assured.

- When developing outdoor recreation areas for intensive and active use, the carrying capacity of the landscape including lakes should be carefully determined so that the natural attributes are not diminished.

- In development of shoreland for recreation purposes, general identification of potential sites using the Canada Land Inventory system could be utilized, followed by specific on-site determinations of desirable locations.

- Prior to the selection and development of sites for outdoor recreation use, the services of trained personnel could be utilized to assist knowledgeable settlers in site selection and planning.

CHAPTER V
HUMAN RESOURCES

5.0 HUMAN RESOURCES

5.1 POPULATION

Historically, Metis families and individuals have periodically moved on and off the Settlement according to employment, housing, and other opportunities. This has resulted in a varying population structure from year to year. Although an annual census has been conducted on the Settlement each year since 1940, the figures can be misleading since survey methodology changed from time to time.

For example, in some years only those persons actually living on the Settlement at the time of survey were counted as residents. However, in others the census has also included those persons still registered as Settlement residents who were temporarily off-Settlement due to employment or other opportunities.

The availabiltiy of population statistics for Elizabeth Metis Settlement is limited and there is some question as to its accuracy. For example, population figures given by the Metis Development Branch did not always coincide with those from the Settlement, as settlers came and left. Nevertheless there is sufficient data available which can be used to produce a generalized indication of historical population characteristics and trends, and to allow some speculation as to trends for the future.

PTER FIVE

5.1.1 POPULATION CHANGE

According to Metis Development Branch census figures, total populations of residents living on Elizabeth Settlement have increased sharply over the past decade. In 1973 there were 272 persons, while at the end of 1983 the population had increased by approximately two-thirds to 417. When the 87 members living off the Settlement are added, the figure jumps to 504 persons (1983).

Throughout the 1960's and 1970's Elizabeth Settlement populations have fluctuated up and down, but the overall trend is one of steady population increase. Since 1979 however the population has escalated sharply. Figure 17 illustrates the general pattern of population levels on the Settlement since 1940.

5.1.2 AGE STRUCTURE

Although population totals have generally been increasing on the Settlement, of greater significance is the age and family structures and the important changes occurring in them. Such influences are important in that they indicate trends towards future population structures and point to potential changes in community, social, and other needs.

Perhaps the most significant trend which appears from the data is that the Settlement seems to be moving once again towards a more youthful population. Throughout the 1970's the proportion of children under age 19 years has steadily increased from a low of approximately 44% of total population in 1972 to 52.4% of total population in 1983. In the earlier period 1965-1970 the proportion of children to adults was in excess of 60%, but declined sharply in the next two years before picking up again through the rest of the seventies.

When compared to Alberta as a whole, the province is tending towards an aging population with only about one-third of its residents less than age 19 years (1980). This is a less than desirable situation since there are significant implications for social service, financial, and other programs geared to a substantial elderly population. Elizabeth Settlement therefore displays a more desirable population structure from that perspective.

Figure 18 illustrates the 1983 population profile for Elizabeth Metis Settlement, and Figure 19 the 1980 profile for the province of Alberta. Table 2 briefly illustrates in numerical terms the historical trends in population structure for the Settlement.

Figure 18 indicates that (as noted earlier) not only is greater than half of the 1983 population below the age of 19 years (52.3%), but the population is almost evenly split between males (51%) and females (49%) on the Settlement. When the off-Settlement population (87 persons) is categorized and added to these totals, the overall characteristics and trends for the Settlement change very little (Figure 20). In other words, the off-Settlement population is also of a youthful nature and almost evenly split between males (49%) and females (51%).

The implications are therefore, that housing, recreation, educational, social, and other services on the Settlement could be placed under additional demand should off-Settlement residents decide they wish to move onto Elizabeth. Moreover, as this youthful population matures to the point where new family units are formed, there may be greater requirements for housing and other services (roads, power, social) on the Settlement.

TABLE 2

Historical Population Trends
Elizabeth Metis Settlement
1965-1983

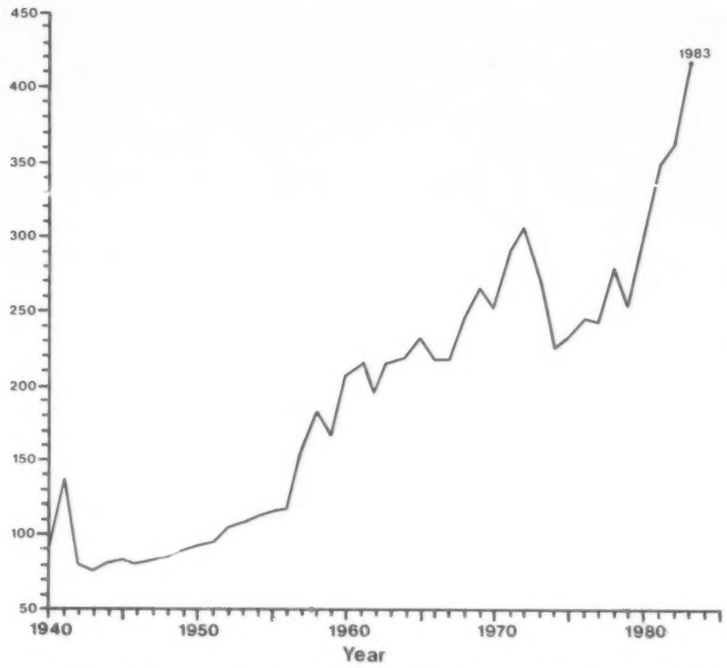
Year	Adult (20-65+)	School Age (5-19)	Pre-School (0-4)	Total
1965	92 (39.5)	94 (40.3)	47 (20.2)	233
1970	96 (37.8)	103 (40.5)	55 (21.6)	254
1976	130 (52.8)	77 (31.3)	39 (15.8)	246
1980	157 (52.5)	114 (38.1)	28 (9.4)	299
1983	199 (47.6)	157 (37.7)	61 (14.7)	417

Note: bracketed figures are percentages;
un-bracketed figures are absolute

Source: Metis Development Branch

Figure 17

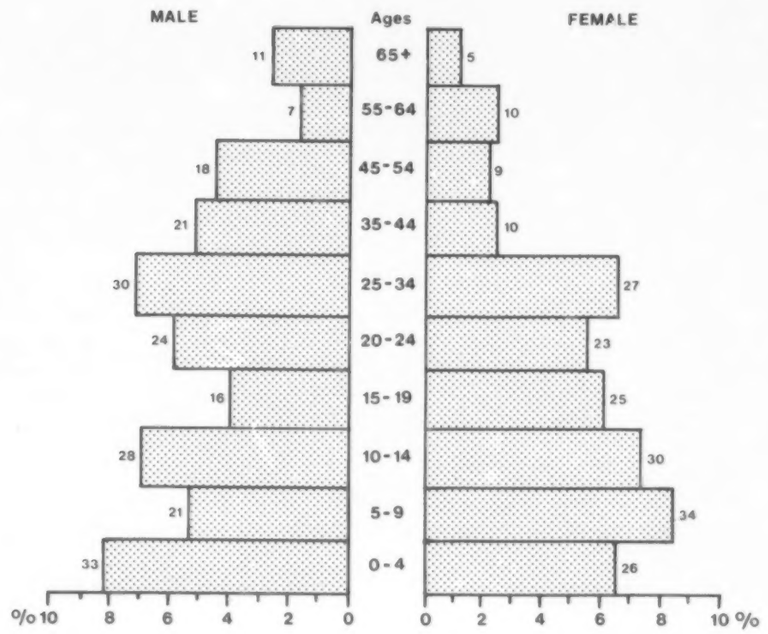
Elizabeth Metis Settlement Annual Total Population 1940–1983
(On Settlement)



Source: Metis Development Branch, Alberta Municipal Affairs, June 1984

Figure 18

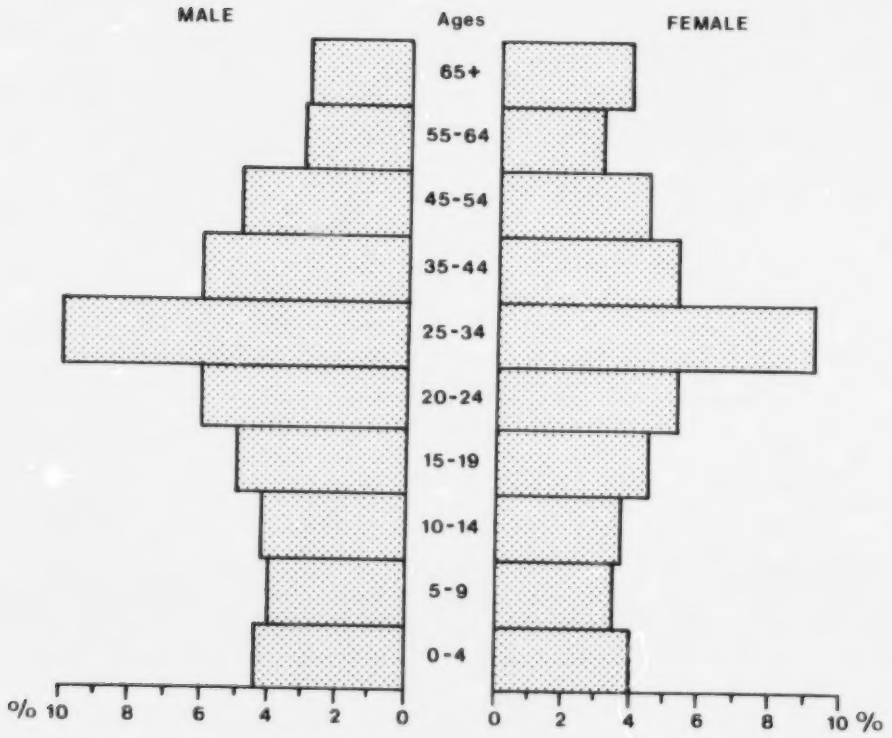
Elizabeth Metis Settlement
Total On - Settlement Population 1983



Source: Metis Development Branch, Alberta Municipal Affairs.
Note: Absolute numbers shown -23

Figure 19

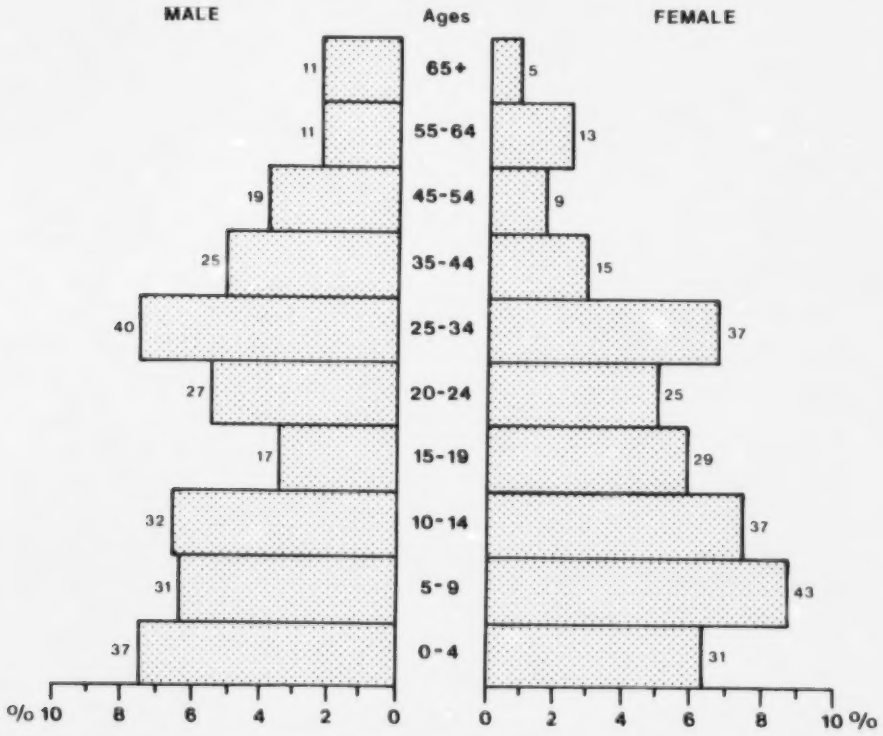
Province of Alberta Total Population 1980



Source: Canada Census

Figure 20

Elizabeth Metis Settlement
Total On and Off - Settlement Population 1983



Source: Metis Development Branch, Alberta Municipal Affairs.
Note: Absolute numbers shown -23

5.1.3 FAMILY STRUCTURE

Although no recent figures are available, in 1979 it was determined that Elizabeth Settlement (population 253) had approximately 60 households with an estimated family size of 4.5 persons (provincial average 3.5 persons). More than 90% of families lived alone with the remainder sharing accommodation with others. Eighty-six percent of households were headed by males (averaging 46 years of age), compared to 81% provincially and 74% on Fishing Lake and Caslan Settlements.

Ties of residents to the Settlement are considered strong. In 1979, 86% of heads of household had been residents of the Settlement for more than three years, and three-quarters for more than ten years.

5.1.4 RESIDENCY

Any person over the age of 18 years who has lived in Alberta for the preceding five years can apply to be a member of a Metis Settlement. At least one grandparent of the person who applies must be of Indian origin. The application for membership is submitted to the local Council. When it is approved, the new person becomes a member of the community. Upon a further application, the member may be allocated a parcel of land.

The local Council, by verifying compliance with admission criteria for new members, and having authority to approve all applications, is in a position to control the rate of in-migration to a level it deems desirable.

Normally the Council must be satisfied that it, or the applicant, has arranged for satisfactory housing and that the applicant will be a good citizen of the community.

5.1.5 OBSERVATION

- The need for social programs and community facilities development could be affected by the changing nature of the population structure on Settlement.

5.2 HOUSING

Residential accommodation for the residents of Elizabeth Settlement has been a matter of considerable interest and importance to the community's citizens and council. The Settlement has been involved in a number of housing programs during the history of the community which to date has resulted in a variety of housing stock numbering some 72 dwelling units. Moreover, almost 60% of the units have been constructed since 1971, indicating a relatively new housing stock.

Virtually all of the dwellings are accessible by good quality, all-weather gravel roads. About 70% of the dwellings are located along rural roadways, while the remainder are clustered in the hamlet. This results in a relatively low housing density which is evident in Figure 21.

Frame houses of "stick built" construction have, in the past, (as recently as 1979) constituted about 95% of the housing stock, while mobile dwelling units comprised the remainder. Recently however, the severe housing shortage has necessitated the use of additional mobile units. In November of 1984 there were said to be 17 units on the Settlement representing almost 24% of the total housing stock.

In a 1979 survey it was noted that approximately 40% of the dwelling units had a furnace, and the remainder had other types of heaters. Currently it is estimated that better than 50% of the dwelling units have furnaces.

A variety of domestic fuels are consumed; the most common, in order of importance include propane, wood, and oil, which together account for most of the fuels used. In 1979 it was noted that wood accounted for more than one-third of the fuels consumed, and that a combination of fuels are used by many households. Natural gas for domestic purposes is not available on the Settlement.

5.2.1 WASKAYIGUN

Housing conditions have undoubtedly improved over the years through the implementation of a number of separate housing programs available through both the federal and provincial governments. These programs have been administered on the Settlement by the local Waskayigun Society, a non-profit housing organization incorporated under the Societies Acts of Alberta and Canada. Waskayigun is a Cree language word meaning housing.

The members of council at Elizabeth also serve in a separate capacity as Directors of the Waskayigun Association which determines housing need and family placement on the Settlement. The Association acts on behalf of settlers seeking housing assistance from various government agencies, as well as organizing and administering the housing programs on the Settlement. The Association orders materials, organizes and supervises the construction crews, and builds the houses.

Frequently local labour is used in the construction process. Local carpenter apprentices are guided on the job by a qualified journeyman carpenter. This experience is later supplemented by more formal training at the Lac La Biche and Grouard campuses of the Alberta Vocational Centre. Alberta Department of Housing frequently assists in the program financially, as well as providing access to a qualified carpenter.

5.2.2 HOUSING PROGRAMS

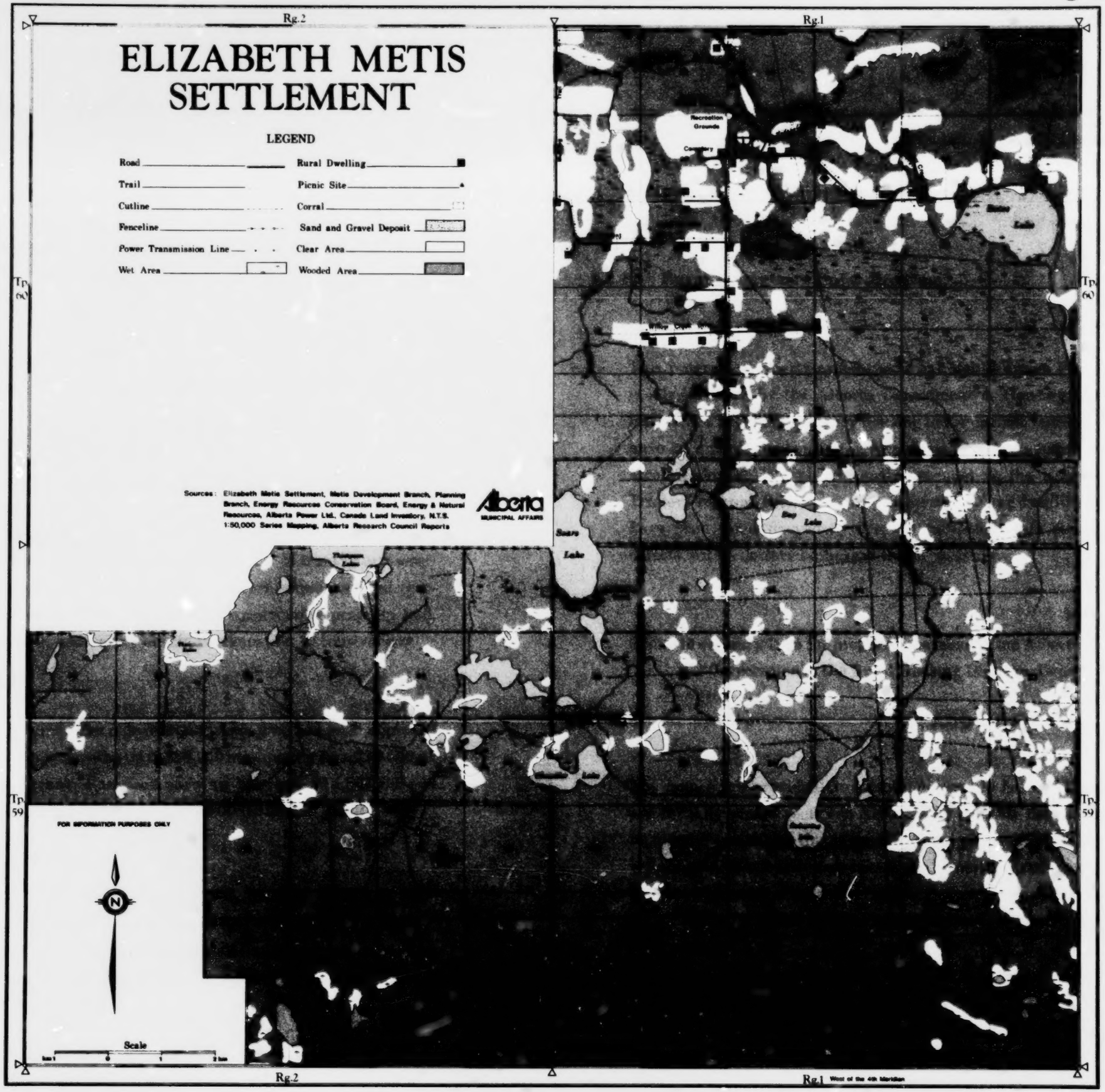
Elizabeth Settlement has actively participated in a number of housing programs over the years. The most significant of these are outlined hereunder.

5.2.2.1 Metis Development Branch (MDB) Housing

This program operated between 1962 and 1967. During that time it provided for the construction of 467 housing units valued at $1,646,900 on the eight Metis Settlements in Alberta. Twelve of these units were constructed on Elizabeth Settlement where local

Figure 21

ELIZABETH METIS SETTLEMENT



settlers were encouraged to cut logs, work at sawing and planing the lumber, and to do much of the work on their own dwellings.

The program was funded by the Alberta Department of Social Services and Community Health through its Metis Development Branch. In 1983 however, this Branch was transferred to the Alberta Department of Municipal Affairs.

5.2.2.2 Metis Settlement Housing Program

This program is a sub-program of the Rural Home Assistance Program administered by the Department of Housing, Alberta. The program's purpose is to help Metis families and Settlements build or repair their own homes through the local Waskayigun Association. The program is of a self-help nature requiring local community management of the housing construction program and, where possible, individual family participation in construction.

The program provides a geared-to-income grant for each approved family. A family earning up to $16,500 may qualify for a $19,500.00 maximum grant. Families earning between $16,501.00 and $31,000.00 may qualify for a $9,750.00 maximum grant.

Under this program an average of four dwelling units per year were constructed on Elizabeth between 1977 and 1984 resulting in a total of 39 units. While eight units were constructed under this program in 1984, there is still a waiting list of 25.

Under the Waskayigun program the recipient of a house is required to pay 10% of the grant as their contribution. Generally the terms of payment of this sum is a matter of negotiation between the recipient and the Waskayigun Association.

5.2.2.3 Rural Emergency Home Program

This program, formerly called the Rural Mobile Home Program, is administered by the Alberta Department of Housing, and is intended to provide temporary housing to low-income families who have an emergency housing need and are unable to obtain other accommodation. It was previously operated as the Emergency Trailer Program. Priority is given to families whose dwellings may have been (a) destroyed by fire; (b) suffered unsafe structural defects, or; (c) declared a hazard to the occupants.

(Note: In January 1985 the program was moved from Alberta Housing Corporation to the Rural Housing Division, Department of Housing).

The homes are provided on a rental/ownership basis. All homes are initially rented (between $100 - $200 monthly depending on adjusted income) and this is applied to the purchase price so that the occupant eventually may become an owner. The purchase price consists of the cost of the unit plus siting expenses. Although interest on the outstanding balance is not assessed, occupants pay for their own utilities.

Applications for mobile homes under this program must be made by the Waskayigun Association (which assesses need) to the Metis Association of Alberta or to the Alberta Department of Housing. In 1977 one unit was applied for and approved on Elizabeth. However, by November 1984 a total of 17 units were required and in use on the Settlement.

5.2.2.4 Residential Rehabilitation Assistance Program

This Federal government program under Canada Mortgage and Housing Corporation (CMHC) provides for repairs to be made on qualifying dwellings. While the program is still in effect, it has not been available to Metis Settlements since 1977 when it was determined that land ownership was necessary to qualify. Nevertheless, prior to 1977, eleven applications for assistance had been granted to Elizabeth Settlement of the twenty-one submitted. Qualified settlers had been eligible to receive up to $5,000 in home repair assistance, with up to $3,750 of that sum a grant.

5.2.2.5 Seniors Programs

In 1976 the Alberta Department of Housing and Public Works implemented the "Senior Citizens' Home Improvement Program (SCHIP)." This program offered qualifying seniors up to $1,000 in grants according to income. Elizabeth Settlement residents received 9 grants totalling $9,000 under the system.

In 1979 the S.C.H.I.P. program was changed to the "Alberta Pioneers Repair Program" with grants up to $2,000 maximum based on income. Elizabeth settlers received 10 grants for $20,000.

In 1980 the Pioneers program was changed to "Seniors Home Improvement Program", with a maximum $3,000 in grants available to qualifiers based on income. To August 1984, eight grants totalling $24,000 have been received on Elizabeth.

With each change in program, the recipients of grants in the previous program were eligible for grants in the new one. Thus it was possible for some eligible persons to receive a total of $6,000 in grants through the three programs.

5.2.2.6 Emergency Repair Program

This federal program, administered by the Metis Association of Alberta for CMHC, grants materials to needy families to help repair homes. Between 1981 and August 1983, some 12 Elizabeth Settlement Residents received aid valued at $9,200. No grants were received for 1984.

5.3 SETTLEMENT INFRASTRUCTURE/ SERVICES

5.3.1 ADMINISTRATION

When the *Metis Betterment Act* was passed in November 1938, the interests of the Settlements were largely in the hands of the Provincial Government. The Metis Rehabilitation Branch was the government agency set up to administer the day-to-day functions of the Settlement. Much of the local control and budgeting was handled by the Area Supervisor. Upon advice from the Council, the Supervisor recommended services and regulations to the Branch. The Branch had authority over roads, agriculture and timber controls, housing, power lines, and schools.

Today's Council, consisting of five locally-elected residents, assisted by a coordinator and a clerk, meet regularly to discuss needs of the Settlement, decide on applications for Settlement membership and land allocation, and submit recommendations for expenditures. There is no private ownership of land on the Settlement, although each family pays a nominal annual land levy.

The Metis Development Branch, now under the Department of Municipal Affairs, also has a District Manager in St. Paul to assist the four eastern Settlement Councils. Authority over roads, education, housing, and utilities is the responsibility of the respective government departments and agencies.

Finances for operational items are obtained from three sources:

1) Provincial appropriations (Settlement vote budget);

2) Metis Population Betterment Trust Fund, which includes annual revenues from oil surface leases, right of entry compensation (seismograph work), cattle sales where applicable, interest on the Trust Fund, land levies, and miscellaneous such as sale of gravel; and

3) Municipal Debt Reduction money.

Revenue for capital items is obtained from:

1) Municipal Debt Reduction money (held in the Metis Settlement Trust Fund);

2) Municipal Debt Reduction interest; and

3) Provincial appropriations (vote budget) from general revenue.

While the Metis Development Branch still administers the dispensation of these monies, the Council now is responsible for submitting the annual budget recommending how funds will be spent. The Branch is increasingly moving toward decentralizing administration to the Settlement Councils and their staff. The Elizabeth Settlement Council is actively involved in locally-initiated projects and development planning.

The Settlement Administration and Council work from a six-office, one-boardroom Alberta government office building located in the hamlet area. Besides the councillors, the personnel accommodated in the building, which is said to be in need of expansion, are the Office Administrator; Clerk; Recreation Director; Agricultural Manager; Waskayigun Bookkeeper; and Health Nurse. A community newsletter, published each month, is printed in the building which also is expected to accommodate an anticipated Housing Director. A site for a new building has been tentatively chosen in the hamlet, but no firm commitment for construction has been established.

5.3.2 HEALTH UNIT

As noted above, the Health Unit operates out of the Administration Building. A community public health nurse visits the Settlement at least twice a month, (and more often as required), and a community health worker visits twice-weekly.

In addition, home-care nursing (for diabetics, dressing change, etc.) is provided as required. Public health services include pre-natal teaching, newborn and communicable disease follow up, TB control, speech therapy, patient and nutrition teaching, and elderly assistance. An immunization clinic is conducted monthly on the Settlement.

Elizabeth residents travel to Cold Lake, Bonnyville, or Grand Centre for hospital, medical clinic, or dentistry services. Ambulance services are also available from these communities. A visiting dental hygiene program provides examinations, cleaning and educational instruction (flossing, brushing, etc) twice a year for Settlement school children up to ten years of age (grades 1, 2, 4, 6). Children also receive a weekly fluoride rinse rather than once annually as was previously the case.

The Department of Social Services and Community Health has the mandate for providing social assistance and child welfare services.

5.3.3 EDUCATION FACILITIES

Elizabeth School is the only education facility on the Settlement, and was newly opened in 1978. It is administered by the Lakeland Catholic School District #150 in Bonnyville, and has provided education for students from Kindergarten to Grade 6. However in 1984/85 the school will offer a Grade 7 class as well.

In 1983/84 there were 91 students and 5 teachers, however in 1984/85 there are 105 enrolled with 7 full-time teachers. In addition there is one teacher-aide; one secretary/Librarian; and one Early Childhood Services teacher on a half-time basis.

The school has offered a special Cree language and cultural program since 1982, as well as special awards for achievement and attendance. A School Food Services program administered by Alberta Education and operated by three members of the community, provides hot lunches to students in the School lunch room. This program has proven to be very popular with the students and the community. Most students speak English when they begin school, and family support of education on the Settlement is said to be quite strong.

After completing elementary education at Elizabeth School on the Settlement, students in Grades 8-12 are bussed to Assumption Catholic School in Grand Centre for junior and senior high school.

Secondary Students are transported by a bus from the Settlement to Grand Centre each school day, while two other buses remain on the Settlement, picking up and delivering elementary students to Elizabeth School. The buses are operated by a local resident who is under contract to the Lakeland Catholic School District #150.

5.3.4 POLICE SERVICES

Policing of the Settlement is the responsibility of the Grand Centre R.C.M.P. detachment. Police patrol the area around and including the Settlement on a regular basis or as requested. Response time in case of an emergency is estimated to be about 15 minutes.

5.3.5 FIRE PROTECTION

Elizabeth Settlement does not have fire fighting equipment nor an organized volunteer fire brigade. It depends on the resources of nearby municipalities for this service. The nearest fire department is in Grand Centre, which has agreements with the Municipal District of Bonnyville and the Town of Cold Lake for emergency situations, but there are no formalized agreements with the Settlement.

5.3.6 ROADS AND TRANSPORTATION SERVICES

Construction and maintenance of roads is the responsibility of Alberta Transportation which upgrades and regravels them according to need and budget. Council recommends priorities for new construction so that desired areas of the Settlement can be opened up for housing or additional agricultural development. Alberta Transportation then responds to these requests according to budget availability, and scheduling, and district roadway requirements and priorities.

The local roads on the Settlement are primarily funded through Alberta's Indian Reserve and Metis Settlements Access Roads Program (1981). It has an annual Budget of $10 million and has been extended through fiscal 1984/85. Other funding for local roads to Metis communities are provided through Alberta Transportation's regular funding of Improvement District local roads; trust funds allocated by Alberta Municipal Affairs for I.D. roads; and funding for the road requirements of the Land Tenure Secretariat in isolated communities.

In the past three fiscal years, Elizabeth Settlement has received a total of $781,914 for maintenance of existing, and construction of new local access roads – 1981/82 – $400,000; 1982/83 – $330,000; 1983/84 – $51,914.

As of August 1984 there were approximatley 62.76 km (39 miles) of good quality gravel roadway in place on the Settlement, (Figure 22) with a proposal to construct an additional 2.4 kms (1.5 miles) by the end of the year (the general yearly average).

Since there are no public transportation facilities serving Elizabeth, residents are heavily reliant on personal or privately-owned vehicles to get to nearby communities. No rail service is available on the Settlement, nor is there an airport. The nearest airport is at Medley in Grand Centre for commercial air service.

5.3.7 RECREATION

The Settlement currently has a 30.5 m by 12.2 m (100 × 40 ft.) community hall built in 1972-73 which is said to be reaching capacity due to increased populations and useage. It is used for bingos, dances, meetings, community bake and other sales, festive occasions, celebrations, and banquets. A part-time Recreation Director appointed by Council, organizes, co-ordinates and supervises activities in the community hall and elsewhere on the Settlement.

An open-air ice skating rink is built adjacent to the hall and is a popular facility during the winter. Two baseball diamonds, a rodeo grounds, and a museum (displaying local artifacts) are also popular. Settlers also enjoy picnicking and fishing at Soars Lake, and have established facilities along its south shore for these and related activities. Other outdoor recreation includes hunting, motorized vehicle and horseback trail riding.

The Settlement has four baseball teams run on a co-operative volunteer basis. The senior men (The Riels) and junior mens (new in 1984) teams as well as the senior ladies (The Challengers) and junior ladies (new in 1984) teams all compete in local league play in neighbouring communities. There is also a local "Pee-Wee" level and a Senior Men's hockey team. The Pee-Wee team was organized in 1983 and plays in local leagues, while the Senior Men play largely exhibition games.

Figure 22

Rg.2 Rg.1

ELIZABETH METIS SETTLEMENT

LEGEND

Road		Rural Dwelling	
Trail		Picnic Site	
Cutline		Corral	
Fenceline		Sand and Gravel Deposit	
Power Transmission Line		Clear Area	
Wet Area		Wooded Area	

Sources: Elizabeth Metis Settlement, Metis Development Branch, Planning Branch, Energy Resources Conservation Board, Energy & Natural Resources, Alberta Power Ltd., Canada Land Inventory, N.T.S. 1:50,000 Series Mapping, Alberta Research Council Reports

Alberta MUNICIPAL AFFAIRS

Tp. 60

Tp. 59

FOR INFORMATION PURPOSES ONLY

N

Scale

km 1 0 1 2 km

Rg.2 Rg.1 West of the 4th Meridian

In addition there are other volunteer committees responsible for a large number of social/cultural activities. The Committees are the School; Lunch Room; Rodeo; Cree/Cultural; Dance Group; Early Childhood Services; Senior Citizens; Youth Club; and Baseball Clubs.

There is considerable local interest in recreation although access to major recreational facilities and to leagues in the region is limited due to the distance from urban centers.

5.3.8 UTILITIES SERVICES

In 1983/84 the Metis Development Branch co-ordinated the installation of a community water system in the hamlet area of the Settlement (see Section 4.7 – see also Figure 9). A 73,477 Litre (16,163 imperial gallon) treatment plant and reservoir was constructed to filter and treat the water prior to distribution. Settlement hamlet dwellings are in the process of connecting to the system.

There is no communal sewage disposal system for the hamlet (or Settlement) although a feasibility study regarding one is being prepared. Elizabeth School has a septic tank and lagoon system for its use. Septic tanks with tile fields and/or outdoor privies are used, particularly in the rural parts of the Settlement. A septic tank program is being considered for residences outside the hamlet area for 1985/86, but has not been confirmed.

Power is available on the Settlement through Alberta Power and its grid. After payment of a hook-up charge, power is extended to dwellings as required. Telephone service is also available on the same basis from Alberta Government Telephones Limited.

Solid wastes are disposed of at an existing garbage dump which is located approximately 1.6 km southwest of the hamlet, just north of Settlement Road. An individual working part-time, hauls and burns garbage twice a week from the church, school lunchroom, Community Hall, and Administration Office. Residents take their own wastes to the landfill site as required.

5.3.9 RELIGIOUS FACILITIES

St. Margueritte Y'Ouville Roman Catholic Church is the only church on Elizabeth Settlement. It was built by the people of the community in 1974 under the supervision of the Priest. Funding for the project came from the Quebec Business Men's Fund.

Settlement Church

CHAPTER VI
PLANNING FRAMEWORK
- GUIDELINES FOR THE FUTURE

6.0 PLANNING FRAMEWORK – GUIDELINES FOR THE FUTURE

6.1 INTRODUCTION

The long-term economic and cultural future of Elizabeth Settlement may benefit from a planned use of its land-based resources. Depletion of wildlife and forest resources; clearing of areas unsuited to farming pursuits due to topographical, soil, or other limitations; conflicting land uses (eg wildlife/cattle); inappropriate road or power extensions; and surface or groundwater pollution could, if not continuously addressed be important short and long-term problems. However, because the Settlement and its Council are astute and informed, they have been aware of and addressing these matters in the past.

It is important therefore that as in the past, the Settlement continue to address the usefulness of policy particularly where new settlers are to be housed, lands opened, and new roads, and power to be extended. In the rural parts of the Settlement this may mean continuing to encourage settlers with farming skills to locate on lands with better agricultural potential, while conserving those lands best suited for wildlife production for hunting and trapping pursuits. It may also mean continuing to encourage grazing to occur only in selected areas, while encouraging timber and wildlife production in others. It may also mean that new road construction may not be directed to opening up additional

ER SIX

lands even more remote from the hamlet, but rather lands relatively near to the hamlet could undergo more intensive useage. Continued planning for and the establishment of priorities by the Settlement and Council could ensure the accommodation of a variety of uses without sacrificing the desired sense of rural living.

In this respect, re-examining policies which permit land allocations to non-farmers on the basis of quarter sections, in favour of encouraging hamlet or rural clustered (country residential) development may be useful.

Currently the population is dispersed but geneally located in the northerly one-sixth of the Settlement. With more people coming onto the Settlement, each seeking a dispersed rural lifestyle, considerable cost increases to open new lands, extend roads and power, and provide and maintain the desired services may create unacceptable financial burdens on the Settlement.

6.2 PURPOSE OF PLANNING GUIDELINES

In any planning exercise it is important to identify the issues and opportunities which may need to be addressed, establish targets or goals to be achieved from them, and to develop strategies (objectives and

policies) to help move toward those targets. Moreover, those most affected by, and those responsible for the administration of this process must not only jointly establish it, but should also carry out thorough, systematic, and timely reviews of any documents prepared.

In this respect, the residents and Council of Elizabeth Settlement (with the assistance of professional planners where necessary and desired) should be the authors of any planning exercise and any land use/development strategy (plan) for the Settlement. Accordingly, **this document should not be viewed as a future land use plan for Elizabeth Settlement.** Rather, it is intended as a series of concepts or ideas which may be useful to review, or to invoke discussion when or should a formal planning exercise be conducted by the Settlement.

It may be that in the current absence of a formal plan or planning exercise, Council may, in the interim, find it useful to consider the planning guidelines in this text as it contemplates expansion or development activities on the Settlement. However, only a carefully prepared, Council endorsed planning document should be used to guide Settlement development over the longer term.

6.3 HAMLET PLANNING GUIDELINES – A PROCESS

6.3.1 OBSERVATIONS

As noted, only the Settlement and its Council can accurately determine development issues and opportunities for the community. The following improvised issues and opportunities are intended for example and discussion purposes **only** and are **not** intended to infer suggested policy direction:

- There is a need to ensure cost-effective useage of new water and power distribution systems.

- An appropriate lotting system which recognizes existing dwellings, structures, and services may be required.

- An adequate supply of large lots for new housing in the hamlet could be needed.

- Maintenance of the Country living hamlet atmosphere is paramount when considering growth.

- An effective hamlet road network is essential.

- Appropriate areas for hamlet expansion (when required) should be identified and protected for future use.

- Establishment of an administrative, cultural and/or recreational focus for the hamlet and Settlement may be useful.

- Installation of a communal sewage system in the hamlet would be of importance to the community.

6.3.2 TARGET (GOALS)

If, for discussion purposes, the above-noted might represent issues and opportunities the Settlement might wish to address, then a longer term target or goal for the hamlet might be:

- *To ensure the development and maintenance of Elizabeth hamlet as an efficiently serviced rural community which provides for adequate housing, appropriate areas of expansion, and an administrative/cultural focus.*

6.3.3 STRATEGIES (OBJECTIVES)

In order to work towards this target (or other pre-determined targets), the Settlement would need to develop appropriate strategies. As an example, some of these strategies might be:

- To develop an appropriate hamlet plan to identify areas to be used for residential, cultural, recreational, commercial, industrial, and administrative purposes.

- To ensure that lotting plans are developed which maximize the use of existing utilities.

- To ensure that hamlet expansion occurs logically outwards from the existing core onto lands which may be easily serviced and readily adaptable for housing.

- To ensure that larger lots and existing vegetation and terrain is retained such that the rural atmosphere of the hamlet is maintained.

6.3.4 POLICIES

Having established a number of strategies, the Settlement should then proceed to ensure as much as possible that actions taken concerning hamlet development, conform to its longer term objectives. Settlement Council may then wish to develop a number of specific guidelines or policies to be applied or considered when hamlet development is contemplated. For example, continuing along from above, the following policies (as fabricated examples only) could serve to demonstrate this point:

- All existing and any new development in Elizabeth Hamlet shall be located such that it can be economically connected to existing water and power utilities.

- Any lots established in the hamlet shall be created such that existing water and power utilities are maximized or can be economically extended to them.

- In order to provide for the future orderly expansion of the hamlet, Settlement Council shall identify and protect (from non-compatible development) appropriate land areas.

- In order to ensure the continued orderly development of Elizabeth hamlet, Council will undertake the preparation of a long range hamlet development plan by (date) 19 __ .

- In the preparation of any long range hamlet plan for the community, Council shall seek the views of the Settlement members.

- All development occurring in the hamlet shall, wherever possible, retain the natural topgraphic features and vegetation.

6.3.5 SUMMARY

As noted above, the foregoing has been provided **only as an example** to demonstrate how Elizabeth Settlement could proceed to develop its own set of planning guidelines for the hamlet. These ideas, although brief, are intended to demonstrate the process using fabricated issues and opportunities which hopefully are meaningful to the Settlement. These concepts are not intended to be representative of issues of current importance on the Settlement and should not be viewed as such.

6.4 RURAL PLANNING GUIDELINES – A PROCESS

6.4.1 OBSERVATIONS

As noted under section 6.3.1, the following observations are intended for example and discussion purposes only and are not intended to infer suggested policy direction. Only the settlement and Council are in a

position to determine issues and opportunities relevant to the Community. For discussion then, some observations (fabricated issues and opportunities) relative to rural development on the Settlement might be:

- The process of land allocations to non-farmers on the basis of quarter-section parcels might be reviewed since almost all of the land base has either been allocated or leased.

- The identification and conservation of better agricultural lands for use in larger parcels by those with farming ambitions and knowledge could be further pursued.

- The desire to enlarge cattle herds and graze them in suitable pasturages, properly enclosed in areas not impacting locations having forestry or wildlife potential, might be further addressed.

- The need to develop and implement an agricultural strategy to effectively use the unique climate and particular talents and resources of the Settlement could be examined.

- The development and implementation of a timber production strategy on appropriate landscapes could be pursued.

- The need to maintain sectors of the Settlement for hunting and trapping as continuous natural environments is important.

- The accommodation of non-farm residential development in the rural area without necessitating the uneconomical extension of transportation and utilities services presents an ongoing challenge.

6.4.2 TARGETS (GOALS)

If the foregoing fabricated set of issues and opportunities can be used for discussion purposes, then a longer term target or goal for the rural land base of the Settlement might be:

- *To maintain the rural area of Elizabeth Settlement as a continuous natural environment and to encourage only such development as may be economically practical and environmentally compatible with its surroundings.*

6.4.3 STRATEGIES (OBJECTIVES)

Thus, in order to move towards this target (goal), the Settlement would need to develop appropriate strategies. As an example, some of these strategies might be:

- To develop an appropriate rural land use plan to identify areas where agriculture, forestry, wildlife, and residential non-farm uses might be encouraged without conflicting with these or other uses.

- To develop and implement agricultural, forestry, and wildlife management strategies using professional assistance.

- To encourage the development of country residential (non-farm) parcels to occur in low density clusters such that they maximize existing utilities and transportation networks and avoid conflicts with other rural land uses.

6.4.4 POLICIES

Thus, once the Settlement has established the rural strategies it considers appropriate, it should then proceed to ensure as much as possible that actions taken concerning rural development conform to its longer term target and objectives. Settlement Council may then wish to develop specific guidelines or policies to be applied or considered when rural development is contemplated.

For example, the following policies (as fabricated examples only) could serve to demonstrate this point:

- Given the conflicting demands on land use, Council, in concert with residents, shall develop a rural land use plan for Elizabeth Settlement by (date) 19 __ .

- Country residential (non-farm) development shall be developed in large-lot clusters in locations which do not conflict with agricultural, wildlife, or natural resources locations or operations.

- Country residential (non-farm) development shall not be permitted to occur on lands having favourable agricultural potential.

- Clearing of land for agricultural purposes shall be encouraged on lands having favourable soils capability ratings, but discouraged on lands having superior wildlife or timber production capabilities.

- The grazing of cattle shall not be permitted on lands having timber or wildlife production potential where such grazing would be incompatible with their production.

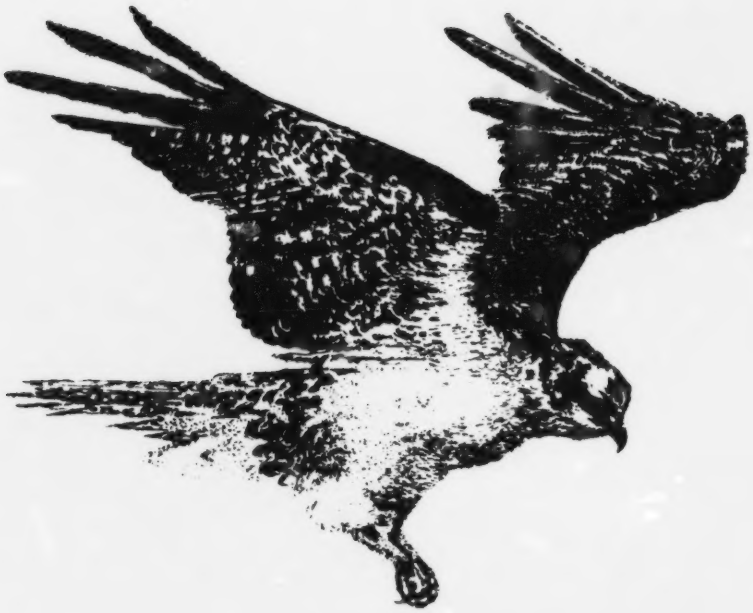
- Residents having farming acumen shall be encouraged to farm larger parcels.

- In order to conserve wildlife populations to the benefit of all residents, limitations on the harvesting of certain big game animals and access to identified habitat shall be implemented.

6.5 SUMMARY

As noted previously these ideas are intended only to promote discussion and demonstrate the process by which the Settlement resources might be effectively managed for the enjoyment of not only current residents, but those to follow as well. This exercise clearly does not suggest that the examples above are goals, objectives and policies to be implemented on the Settlement, but rather are hypothetical examples to which the Settlement can hopefully relate. They are intended to suggest only a process which can assist the Settlement in managing and developing the potential of its vast land-based resources.

There is no doubt that with proper management, the resources of this Settlement can contribute to a most joyous lifestyle in harmony with the Metis culture. There is no doubt, that with the forward-thinking leadership evident on the Settlement to date, that this success will be achieved.



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APPENDICES

DESCRIPTIVE LEGEND

In this classification the mineral soils are grouped into seven classes on the basis of soil survey information. Soils in classes 1, 2, 3 and 4 are considered capable of sustained use for cultivated field crops, those in classes 5 and 6 only for perennial forage crops and those in class 7 for neither.

Some of the important factors on which the classification is based are:

- The soils will be well managed and cropped, under a largely mechanized system.
- Land requiring improvements, including clearing, that can be made economically by the farmer himself, is classed according to its limitations or hazards in use after the improvements have been made. Land requiring improvements beyond the means of the farmer himself is classed according to its present condition.
- The following are not considered: distances to market, kind of roads, location, size of farms, type of ownership, cultural patterns, skill or resources of individual operators, and hazard of crop damage by storms.

The classification does not include capability of soils for trees, tree fruits, small fruits, ornamental plants, recreation, or wildlife.

The classes are based on intensity, rather than kind, of their limitations for agriculture. Each class includes many kinds of soil, and many of the soils in any class require unlike management and treatment.

1 SOILS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS IN USE FOR CROPS.

The soils are deep, are well to imperfectly drained, hold moisture well, and in the virgin state were well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for a wide range of field crops.

2 SOILS IN THIS CLASS HAVE MODERATE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE MODERATE CONSERVATION PRACTICES.

The soils are deep and hold moisture well. The limitations are moderate and the soils can be managed and cropped with little difficulty. Under good management they are moderately high to high in productivity for a fairly wide range of crops.

3 SOILS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES.

The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops.

4 SOILS IN THIS CLASS HAVE SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES, OR BOTH.

The limitations seriously affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. The soils are low to fair in productivity for a fair range of crops but may have high productivity for a specially adapted crop.

5 SOILS IN THIS CLASS HAVE VERY SEVERE LIMITATIONS THAT RESTRICT THEIR CAPABILITY TO PRODUCING PERENNIAL FORAGE CROPS, AND IMPROVEMENT PRACTICES ARE FEASIBLE.

The limitations are so severe that the soils are not capable of use for sustained production of annual field crops. The soils are capable of producing native or tame species of perennial forage plants, and may be improved by use of farm machinery. The improvement practices may include clearing of bush, cultivation, seeding, fertilizing, or water control.

Capability for Agriculture

6 SOILS IN THIS CLASS ARE CAPABLE ONLY OF PRODUCING PERENNIAL FORAGE CROPS, AND IMPROVEMENT PRACTICES ARE NOT FEASIBLE.

The soils provide some sustained grazing for farm animals, but the limitations are so severe that improvement by use of farm machinery is impractical. The terrain may be unsuitable for use of farm machinery, or the soils may not respond to improvement, or the grazing season may be very short.

7 SOILS IN THIS CLASS HAVE NO CAPABILITY FOR ARABLE CULTURE OR PERMANENT PASTURE.

This class also includes rockland, other non-soil areas, and bodies of water too small to show on the maps.

8 ORGANIC SOILS (Not placed in capability classes)

SUBCLASSES

Excepting Class 1, the classes are divided into subclasses on the basis of kinds of limitation. The subclasses are as follows:

SUBCLASS **C**: adverse climate — The main limitation is low temperature or low or poor distribution of rainfall during the cropping season, or a combination of these.

SUBCLASS **E**: erosion damage — Past damage from erosion limits agricultural use of the land.

* SUBCLASS **I**: inundation — Flooding by streams or lakes limits agricultural use.

* SUBCLASS **P**: stoniness — Stones interfere with tillage, planting, and harvesting.

* SUBCLASS **R**: shallowness to solid bedrock — Solid bedrock is less than three feet from the surface.

SUBCLASS **S**: soil limitations — Limitations include one or more of the following: undesirable structure, low permeability, a restricted rooting zone because of soil characteristics, low natural fertility, low moisture-holding capacity, salinity.

SUBCLASS **T**: adverse topography — Either steepness or the pattern of slopes limits agricultural use.

SUBCLASS **W**: excess water — Excess water other than from flooding limits use for agriculture. The excess water may be due to poor drainage, a high water table, seepage or runoff from surrounding areas.

SUBCLASS **X**: Soils having a moderate limitation caused by the cumulative effect of wo or more adverse characteristics which singly are not serious enough to affect the class rating.

CONVENTIONS

Large arabic numerals denote capability classes.
Small arabic numerals placed after a class numeral give the approximate proportion of the class out of a total of 10. Letters placed after class numerals denote the subclasses, i.e. limitations.

* Denotes class or subclass not present on this map.

EXAMPLES

An area of Class 4 land with topography and stoniness limitations is shown thus: 4^{T}_{P}

An area of Class 2 with topographic limitation, and Class 4 with stoniness limitation, in the proportions of 7:3 is shown thus: $2^{7}_{T}4^{3}_{P}$

Appendix 2

Canada Land Inventory – Land Capability for Forestry

DESCRIPTIVE LEGEND

In this classification all mineral and organic soils are grouped into one of seven classes based upon their inherent ability to grow commercial timber. The best lands of Canada for commercial tree growth will be found in Class 1 and those in Class 7 cannot be expected to yield timber in commercial quantities, these represent the extremes. Because of unsuitable climate no Class 1 lands will be found in several regions of Canada and in certain regions the Class 2 areas will be too small to show at the chosen scales of mapping.

Some of the important factors on which the classification is based are:

• All known or inferred information about the unit including subsoil, soil profile, depth, moisture, fertility, landform, climate and vegetation.

• Associated with each capability class is a productivity range based on the mean annual increment of the best species or group of species adapted to the site at or near rotation age. Productivity classes are expressed in gross merchantable cubic foot volume to a minimum diameter of four inches. Thinnings, bark, and branch wood are not included. The productivity as expressed is that of "normal", i.e., fully-stocked stands. It may be assumed that only good management would have produced stands of this nature.

• The following are not considered: location, access, distance to markets, size of units, ownership, present state or special crops such as Christmas trees.

The classes are based on the natural state of the land without improvements such as fertilization, drainage or amelioration practices. It is realized that with improved forest management the productivity may change; to the extent that the limitations shown in the symbol may be altered, class changes may also take place. However, significant changes will only be achieved through costly and continuing practices.

* **1** LANDS HAVING NO IMPORTANT LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Soils are deep, permeable, of medium texture, moderately well-drained to imperfectly drained, have good water-holding capacity and are naturally high in fertility. Their topographic position is such that they frequently receive seepage and nutrients from adjacent areas. They are not subject to extremes of temperature or evapotranspiration. Productivity will usually be greater than 111 cubic feet per acre per year.

When required this class may be subdivided on the basis of productivity into classes 1 (111 to 130), 1a (131 to 150), 1b (151 to 170), 1c (171 to 190), 1d (191 to 210), and by 20 cubic foot classes thereafter, as necessary.

* **2** LANDS HAVING SLIGHT LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Soils are deep, well-drained to moderately well-drained, of medium to fine texture and have good water-holding capacity.

The most common limitations (all of a relatively slight nature) are: adverse climate, soil moisture deficiency, restricted rooting depth, somewhat low fertility, and the cumulative effects of several minor adverse soil characteristics.

Productivity will usually be from 90 to 110 cubic feet per acre per year.

3 LANDS HAVING MODERATE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Soils may be deep to somewhat shallow, well to imperfectly drained, of medium to fine texture with moderate to good water-holding capacity. They may be slightly low in fertility or suffer from periodic moisture imbalances.

The most common limitations are: adverse climate, restricted rooting depth, moderate deficiency or excess of soil moisture, somewhat low fertility, impeded soil drainage, exposure (in maritime areas) and occasional inundation.

Productivity will usually be from 71 to 90 cubic feet per acre per year.

4 LANDS HAVING MODERATELY SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Soils may vary from deep to moderately shallow, from excessive through imperfect to poor drainage, from coarse through fine texture, from good to poor moisture holding capacity, from good to poor structure and from good to low natural fertility.

The most common limitations are: moisture deficiency or excess, adverse climate, restricted rooting depth, poor structure, excessive carbonates, exposure, or low fertility.

Productivity will usually be from 51 to 70 cubic feet per acre per year.

5 LANDS HAVING SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Soils are frequently shallow to bedrock, stoney, excessively or poorly drained of coarse or fine texture, may have poor moisture holding capacity and be low in natural fertility.

The most common limitations (often in combination) are: moisture deficiency or excess, shallowness to bedrock, adverse regional or local climate, low natural fertility, exposure particularly in maritime areas, excessive stoniness and high levels of carbonates.

Productivity will usually be from 31 to 50 cubic feet per acre per year.

6 LANDS HAVING SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

The mineral soils are frequently shallow, stoney, excessively drained, of coarse texture and low in fertility. A large percentage of the land in this class is composed of poorly drained organic soils.

The most common limitations (frequently in combination) are: shallowness to bedrock, deficiency or excess of soil moisture, high levels of soluble salts, low natural fertility, exposure, inundation and stoniness.

Productivity will usually be from 11 to 30 cubic feet per acre per year.

7 LANDS HAVING SEVERE LIMITATIONS WHICH PRECLUDE THE GROWTH OF COMMERCIAL FORESTS.

Mineral soils are usually extremely shallow to bedrock, subject to regular flooding, or contain toxic levels of soluble salts. Actively eroding or extremely dry soils may also be placed in this class. A large percentage of the land is very poorly drained organic soils.

The most common limitations are: shallowness to bedrock, excessive soil moisture, frequent inundation, active erosion, toxic levels of soluble salts, and extremes of climate or exposure.

Productivity will usually be less than 10 cubic feet per acre per year.

SUBCLASSES

Except for Class 1, subclasses indicate the kind of limitation for each class. The subclasses are as follows:

CLIMATE

Denotes a significant adverse departure from what is considered the median climate of the region, that is, a limitation as a result of local climate, adverse regional climate will be expressed by the class level.

SUBCLASS A – droughty or arid conditions as a result of climate.

SUBCLASS C – a combination of more than one climatic factor or when it is not possible to decide which of two or more features of climate is significant.

SUBCLASS H – low temperatures, that is too cold.

SUBCLASS U – exposure.

SOIL MOISTURE

Denotes a soil moisture condition less than optimum for the growth of commercial forests but not including inundation.

SUBCLASS M – soil moisture deficiency.

SUBCLASS W – soil moisture excess.

SUBCLASS X – a pattern of "M" and "W" too intimately associated to map separately.

SUBCLASS Z – a pattern of wet organic soils and bedrock too intimately associated to map separately.

PERMEABILITY AND DEPTH OF ROOTING ZONE

Denotes limitations of soil permeability or physical limitation to rooting depth.

SUBCLASS D – physical restriction to rooting by dense or consolidated layers, other than bedrock.

SUBCLASS R – restriction of rooting zone by bedrock.

SUBCLASS Y – intimate pattern of shallowness and compaction or other restricting layers.

OTHER SOIL FACTORS

Denote factors of the soil which, individually or in combination, adversely affect growth.

SUBCLASS E – actively eroding soils.

SUBCLASS F – low fertility.

SUBCLASS I – soils periodically inundated by streams or lakes.

SUBCLASS K – presence of perennially frozen material.

SUBCLASS L – nutritional problems associated with high levels of carbonates.

SUBCLASS N – excessive levels of toxic elements such as soluble salts.

SUBCLASS P – stoniness which affects forest density or growth.

SUBCLASS S – a combination of soil factors, none of which, by themselves would affect the class level but cumulatively lower the capability class.

TREE SPECIES INDICATORS

The species which can be expected to yield the volume associated with each class are shown as part of the symbol. Only indigenous species adapted to the region and land are shown. Where only one species indicator is shown in a complex it applies to all classes.

jP ..... Jack Pine
bS ..... Black Spruce
wS ..... White Spruce

CONVENTIONS

Large arabic numerals denote capability classes.

Small arabic numerals placed after a class numeral give the approximate proportion of the class out of a total of 10. Letters placed after class numerals denote the subclasses, i.e., limitations. Letters placed below large arabic numerals denote tree name abbreviations.

*Denotes class not present on this map.

EXAMPLES

An area of Class 4 land with soil moisture deficiency and white spruce indicator species: $4_{\substack{M\\wS}}$

An area of Class 4, with moisture deficiency and Class 5 with a soil depth limitation, in the proportion of 8:2 and white spruce and trembling aspen indicators species: $4^{8}_{\substack{M\\wS}}5^{2}_{\substack{R\\tA}}$

N.B. The colour used for a complex area is determined by the first digit of the symbol. The dominant class appears first in a complex symbol.

DESCRIPTIVE LEGEND

In general, the needs of all ungulates are much alike: each individual and species must have a sufficient quality and quantity of food, protective cover, and space to meet its needs for survival, growth, and reproduction. The ability of the land to meet those needs is determined by the individual requirements of the species or group of species under consideration, the physical characteristics of the land, and those factors, such as climate, that influence the plant and animal communities.

On this map the land is divided into units on the basis of physiographic characteristics important to wild ungulates. The degree of limitation associated with each unit determines its capability class. The subclass denotes the primary factor that causes the limitation.

This classification system is based on two important considerations:

- Capability ratings are established on the basis of the optimum vegetational stage (successional stage) that can be maintained with good wildlife management practices.
- Capability ratings assigned do not reflect present land use (except in extreme cases such as heavily populated urban areas), ownership, lack of access, distance from cities, or amount of hunting pressure.

1 LANDS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is high. They provide a wide variety and abundance of food plants and other habitat elements.

2 Lands in this special class are Class 1 areas that are winter ranges on which animals from surrounding areas depend.

3 LANDS IN THIS CLASS HAVE VERY SLIGHT LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is high but less than Class 1. Slight limitations are due to climatic or other factors.

4 Lands in this special class are Class 2 areas that are winter ranges on which animals from surrounding areas depend.

5 LANDS IN THIS CLASS HAVE SLIGHT LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is moderately high, but productivity may be reduced in some years. Slight limitations are due to characteristics of the land that affect the quality and quantity of habitat, or to climatic factors that limit the mobility of ungulates or the availability of food and cover.

6 Lands in this special class are Class 3 areas that are winter ranges on which animals from surrounding areas depend.

7 LANDS IN THIS CLASS HAVE MODERATE LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is moderate. Limitations are similar to those in Class 3, but the degree is greater.

8 LANDS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is moderately low. Limitations are usually a combination of two or more of climate, soil moisture, fertility, depth to bedrock or other impervious layer, topography, flooding, exposure, and adverse soil characteristics.

9 LANDS IN THIS CLASS HAVE SEVERE LIMITATIONS TO THE PRODUCTION OF UNGULATES.

Capability on these lands is very low. Limitations are so severe that they are easily recognized; for example, soil depth may be negligible or climatic factors so extreme that ungulate populations are severely reduced.

* **10** LANDS IN THIS CLASS HAVE LIMITATIONS SO SEVERE THAT THERE IS NO UNGULATE PRODUCTION.

and Capability for Ungulates

SUBCLASSES

With the exception of Class 1, the classes are divided into subclasses according to the nature of the limitations, which determine the class. In most cases the limitations do not affect the animals themselves, but rather the ability of the land to produce suitable food and cover plants. For convenience the subclasses are placed in two main groups: those relating to climate and those relating to inherent characteristics of the land.

CLIMATE

The following are used to denote significant climatic factors that may affect either the animals or the ability of the land to produce suitable food and cover.

SUBCLASS **A**: aridity — Drought or aridity that adversely affects the habitat.

* SUBCLASS **C**: climate — A combination of climatic factors acting to reduce favorable habitat, and the production and survival of ungulates.

* SUBCLASS **Q**: snow depth — Excessive snow depth that reduces the mobility of ungulates and availability of food plants.

* SUBCLASS **U**: exposure or aspect — Special climatic factors, such as exposure to prevailing winter winds, that adversely affect the animals or their habitat.

LAND

The following subclasses are used to denote significant characteristics of land that limit its usefulness for producing suitable food and cover. Some may also have a slight adverse effect on the animals.

SUBCLASS **F**: fertility — Lack of nutrients in the soil for optimum plant growth.

* SUBCLASS **G**: landform — Poor distribution or interspersion of landforms necessary for optimum ungulate habitat.

* SUBCLASS **I**: inundation — Excessive water level fluctuation or tidal action that adversely affects the habitat or survival of ungulates.

SUBCLASS **M**: soil moisture — Poor soil moisture, either excessive or deficient.

SUBCLASS **N**: adverse soil characteristics — Excessive salinity, lack of essential trace elements, or abundance of toxic elements in the soil.

* SUBCLASS **R**: soil depth — Restriction of the rooting zone by bedrock or other impervious layers.

SUBCLASS **T**: adverse topography — Either steepness or flatness of the land.

UNGULATE INDICATOR SPECIES

Species of ungulates for which capability ratings are assigned are shown by the following symbols:

A	Antelope	*E*	Elk
**C*	Caribou	**G*	Mountain goat
D	Deer (white-tailed deer, Columbia black-tailed deer, mule deer)	*M*	Moose
		**S*	Mountain sheep

CONVENTIONS

Large arabic numerals denote capability class.

Small arabic numerals placed after class numeral or special class symbols indicate the approximate proportion (in tenths) of the complex that is represented by that class. The dominant class appears first in the symbol.

Small upper case letters placed after class numeral or special class symbols denote the subclasses, i.e., limitations.

Upper case italic letters placed beneath the class numeral denote ungulate species.

* Denotes class, subclass or ungulate species not present on this map.

EXAMPLES

An area of Class 5 land with topography and soil fertility limitations to deer production is shown: 5^{T}_{F} (*D*)

An area of which 70% is Class 4 for deer with limitations due to snow depth and topography and 30% is class 3 wintering area for elk and moose with slight limitations due to snow depth: $4^{7}_{T}3W^{3}_{Q}$ (*D* *EM*)

An important wintering area for deer and mountain sheep of which 60% is Class 1 and 40% is Class 2 with slight limitation due to exposed bedrock is shown: $1W^{6}_{DS}\ 2W^{4}_{R}$ (*DS*)

Appendix 4

Canada Land Inventory – Land Capability for Recreation

DESCRIPTIVE LEGEND

Seven classes of land are differentiated on the basis of the intensity of outdoor recreational use, or the quantity of outdoor recreation, which may be generated and sustained per unit area of land per annum, under perfect market conditions.

"Quantity" may be measured by visitor days, a visitor day being any reasonable portion of a 24 hour period during which an individual person uses a unit of land for recreation.

"Perfect market conditions" implies uniform demand and accessibility for all areas, which means that location relative to population centres and to present access do not affect the classification.

Intensive and dispersed activities are recognized. Intensive activities are those in which relatively large numbers of people may be accommodated per unit area, while dispersed activities are those which normally require a relatively larger area per person.

Some important factors concerning the classification are:

- The purpose of the inventory is to provide a reliable assessment of the quality, quantity and distribution of the natural recreation resources within the settled parts of Canada.
- The inventory is of an essentially reconnaissance nature, based on interpretation of aerial photographs, field checks, and available records, and the maps should be interpreted accordingly.
- The inventory classification is designed in accordance with present popular preferences in non-urban outdoor recreation. Urban areas (generally over 1,000 population with permanent urban character), as well as some non-urban industrial areas, are not classified.
- Land is ranked according to its natural capability under existing conditions, whether in natural or modified state; but no assumptions are made concerning its capability given further major artificial modifications.
- Sound recreation land management and development practices are assumed for all areas in practical relation to the natural capability of each area.
- Water bodies are not directly classified. Their recreational values accrue to the adjoining shoreland or land unit.
- Opportunities for recreation afforded by the presence in an area of wildlife and sport fish are indicated in instances where reliable information was available, but the ranking does not reflect the biological productivity of the area. Wildlife capability is indicated in a companion series of maps.

1 LANDS IN THIS CLASS HAVE VERY HIGH CAPABILITY FOR OUTDOOR RECREATION.

Class 1 lands have natural capability to engender and sustain very high total annual use based on one or more recreational activities of an intensive nature.

Class 1 land units should be able to generate and sustain a level of use comparable to that evident at an outstanding and large bathing beach or a nationally known ski slope.

2 LANDS IN THIS CLASS HAVE A HIGH CAPABILITY FOR OUTDOOR RECREATION.

Class 2 lands have natural capability to engender and sustain high total annual use based on one or more recreational activities of an intensive nature.

3 LANDS IN THIS CLASS HAVE A MODERATELY HIGH CAPABILITY FOR OUTDOOR RECREATION.

Class 3 lands have natural capability to engender and sustain moderately high total annual use based usually on intensive or moderately intensive activities.

4 LANDS IN THIS CLASS HAVE MODERATE CAPABILITY FOR OUTDOOR RECREATION.

Class 4 lands have natural capability to engender and sustain moderate total annual use based usually on dispersed activities.

5 LANDS IN THIS CLASS HAVE MODERATELY LOW CAPABILITY FOR OUTDOOR RECREATION.

Class 5 lands have natural capability to engender and sustain moderately low total annual use based on dispersed activities.

6 LANDS IN THIS CLASS HAVE LOW CAPABILITY FOR OUTDOOR RECREATION.

Class 6 lands lack the natural quality and significant features to rate higher, but have the natural capability to engender and sustain low total annual use based on dispersed activities.

7 LANDS IN THIS CLASS HAVE VERY LOW CAPABILITY FOR OUTDOOR RECREATION.

Class 7 lands have practically no capability for any popular types of recreation activity, but there may be some capability for very specialized activities with recreation aspects, or they may simply provide open space.

SUBCLASSES

Subclasses indicate the kinds of features which provide opportunity for recreation. They are, therefore, positive aspects of land and do not indicate limitations to use. Features may be omitted from a unit, either because of the imposed three-feature limit, or because their presence was unknown or unconfirmed.

The degree to which these features are judged capable, collectively, of generating and sustaining use for recreation, determines the class. The sequence in which they are listed indicates the order of their significance. Subordinate features may be relatively insignificant and the class of a unit should not be interpreted to indicate the capability of a secondary or tertiary feature.

The subclasses are:

SUBCLASS **A**—Land providing access to water affording opportunity for angling or viewing of sport fish.

SUBCLASS **B**—Shoreland capable of supporting family beach activities. In high class units this will include family bathing. In Classes 4 and 5, the activities may be confined to dry land due to cold water or other limitations.

SUBCLASS **C**—Land fronting on and providing direct access to waterways with significant capability for canoe tripping.

SUBCLASS **D**—Shoreland with deeper inshore water suitable for swimming or boat mooring or launching.

SUBCLASS **E**—Land with vegetation possessing recreational value.

* SUBCLASS **F**—Waterfall or rapids.

* SUBCLASS **G**—Significant glacier view or experience.

SUBCLASS **H**—Historic or pre-historic site.

* SUBCLASS **J**—Area offering particular opportunities for gathering and collecting items of popular interest.

SUBCLASS **K**—Shoreland or upland suited to organized camping, usually associated with other features.

SUBCLASS **L**—Interesting landform features other than rock formations.

SUBCLASS **M**—Frequent small water bodies or continuous streams occurring in upland areas.

SUBCLASS **N**—Land (usually shoreland) suited to family or other recreation lodging use.

SUBCLASS **O**—Land affording opportunity for viewing of upland wildlife.

SUBCLASS **P**—Areas exhibiting cultural landscape patterns of agricultural, industrial or social interest.

SUBCLASS **Q**—Areas exhibiting variety, in topography or land and water relationships, which enhances opportunities for general outdoor recreation such as hiking and nature study or for aesthetic appreciation of the area.

SUBCLASS **R**—Interesting rock formations.

SUBCLASS **S**—A combination of slopes, snow conditions and climate providing downhill skiing opportunities.

* SUBCLASS **T**—Thermal springs.

* SUBCLASS **U**—Shoreland fronting water accommodating yachting or deep water boat tripping.

SUBCLASS **V**—A vantage point or area which offers a superior view relative to the class of the unit(s) which contain it, or a corridor or other area which provides frequent viewing opportunities.

SUBCLASS **W**—Land affording opportunity for viewing of wetland wildlife.

* SUBCLASS **X**—Miscellaneous features with recreational capability.

SUBCLASS **Y**—Shoreland providing access to water suitable for popular forms of family boating.

SUBCLASS **Z**—Areas exhibiting major, permanent, non-urban man-made structures of recreational interest.

CONVENTIONS

Large arabic numerals denote capability classes.

Upper case letters denote subclasses.

There may be area distortion due to scale limitations, particularly in the case of corridor-shaped units.

Unclassified areas represent urban and certain reserve lands.

* Denotes class or subclass not present on this map.

EXAMPLES

An area of Class 1 shoreland with very high capability to generate intensive family bathing and beach activities, fronting and providing access to a water body suited to family boating, and with a backshore suited to organized camping is shown thus: 1^{BK}_{Y}

A complex of shoreland units composed of Class 4 with capability for lodging and family boating, Class 4 lodging and family bathing, and Class 5 offering opportunities for viewing of wetland wildlife and angling or viewing of sport fish, in the proportions of 5.3:2, is shown thus: $4^{5}_{NY}\,4^{3}_{NB}\,5^{2}_{WA}$